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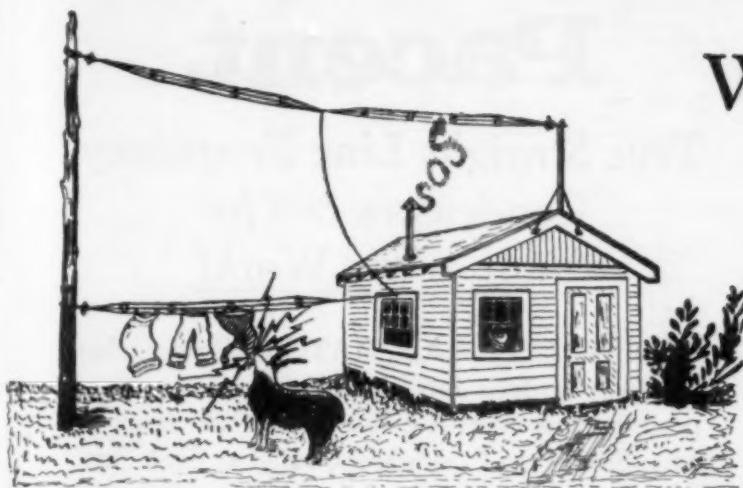
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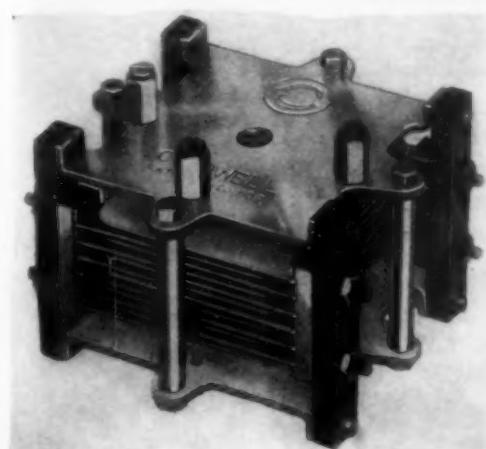


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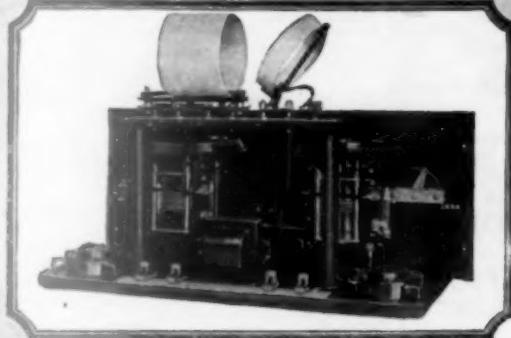


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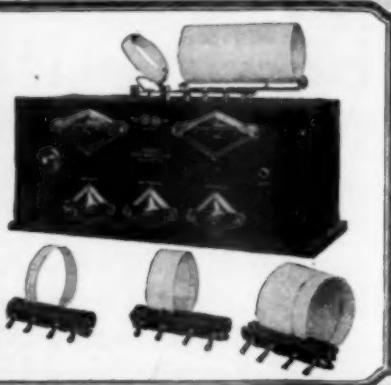
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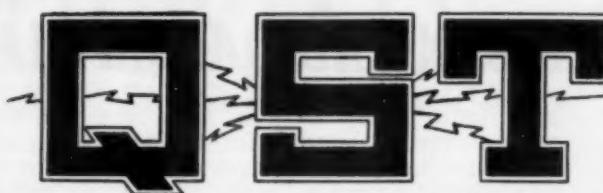
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JUN-2'26

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THE AMERICAN RADIO RELAY LEAGUE

The American Radio Relay League, Inc., is a non-commercial association of radio amateurs, bonded for the promotion of interest in amateur radio communication and experimentation, for the relaying of messages by radio, for the advancement of the radio art and of the public welfare, for the representation of the radio amateur in legislative matters, and for the maintenance of fraternalism and a high standard of conduct.

It is an incorporated association without capital stock, chartered under the laws of Connecticut. Its affairs are governed by a Board of Directors, elected every two years by the general membership. The officers are elected or appointed by the Directors. The League is non-commercial and no one commercially engaged in the manufacture, sale or rental of radio apparatus is eligible to membership on its Board.

"Of, by and for the amateur", it numbers within its ranks practically every worth-while amateur in the world and has a history of glorious achievement as the standard-bearer in amateur affairs.

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EDITORIALS

de AMERICAN RADIO RELAY LEAGUE



The Problem of Regulation

IF THERE is any more befooled an art than radio we want to know what it is. For eight unhappy years there has been an unceasing effort to secure a modification of the admittedly inadequate radio act of 1912 but still "ND". There is a fine mess of fish now created by the Government's test case against Zenith, with the implications at the end whereof no man can guess. Anything can happen now. But, judging the legislative future by the past, it isn't likely that anything will happen, at least not very soon.

The Court's decision in the Zenith case disclosed a large and husky Senegambian who had been carefully concealed in the Department of Commerce's woodpile. Not that the Department and some of the more intelligent radio people like ourselves (ahem!) didn't know that he was there, but never before had the wood been neatly stripped away to leave him blinking in the sunlight before the gaze of the whole radio public. This mysterious personage was disclosed by the decision of Judge Wilkerson that it manifestly had been the intent of Congress, in framing the 1912 radio law, to specify in the regulations in Section 4 all of the regulations that could be applied to radio administration, and that, except in the few cases of specific discretionary power given the Secretary of Commerce, he is not authorized to apply and enforce the numerous other restrictions and regulations governing power, wave lengths, operating hours, and so on, with which we have become so familiar in recent years.

But is all now lost save honor, is chaos now upon us? Not by several picofarads! Fortunately the nature of the few cases of specific discretionary power given the Secretary is sufficient to preserve control of 98% of the broadcasting of the country, and that is where it was feared the bad boys of radio might be found. Let us look into this Zenith case a bit more. The thing revolved around Regulation Fifteen of Section 4, which says that no private or commercial station not engaged in commercial radio communication or in experimentation in connection with the development and manufacture of radio apparatus for commercial purposes shall use a wavelength over 200 meters except by special authority of the Secretary. The Zenith company held that they were engaged in the kind of experimentation mentioned, and therefore were

exempt from the necessity of having the Secretary's permission to use a certain wavelength, and that they therefore were entitled to follow the provisions of Regulation One which requires every such station to designate its normal sending wave, which shall not exceed 600 meters or shall exceed 1600 meters. The Court upheld their contention, and Zenith is thus free to select any wave it wants except between 600 and 1600 meters. However, this does not mean that all the applecarts are upset. By far the great majority of the broadcast stations, 98% of them it is said, are not engaged either in commercial radio communication or in the type of experimentation mentioned, and therefore get to operate in the present broadcast band only by the discretionary special authority of the Secretary, and thus remain in his control as much as ever.

But some of the implications of this decision are somewhat disconcerting to the amateur. For instance, it is emphasized that the garden variety of broadcasting station falls within that class of stations whose normal sphere of operation is the waves below 200 meters, and that any such station is entitled without more ado to invade the short waves, provided in the process it can avoid running afoul of some other regulation or technicality. It is also made clear that the Department of Commerce has no legal right to impose on the stations eligible to operate below 200 meters any additional regulations not expressly written into Section 4 of the 1912 law or provided for therein. Thus wavelength assignments in narrow bands, quiet hours, limitations on types of apparatus—all may be held to be without legal standing. This applies not only to us amateurs but to every other class of station found entitled to operate on waves below 200 meters.

This situation has been no secret to the officers and the Legislative Committee of the A.R.R.L. They have known of it for years. In common with other radio interests, however, they have realized that the art has far outstripped the 1912 law, that the demand for radio channels is so pressing that no one interest has a right to more than it needs, and that as long as adequate legislation is withheld by the procrastination of politicians it is necessary to govern the art by extra-legal agreements arrived at in a spirit of mutual consideration and good-will. The national radio conferences of Secretary Hoover have provided that opportunity.

Now that it has been thoroly aired that the regulations applied to amateur radio at present are extra-legal, it seems necessary to do some very plain talking in these columns. We want to say that, law or no law, the American Radio Relay League stands four-square and solidly for the "gentlemen's agreements" of the Fourth National Radio Conference to which it is a party. It believes that the progress of the art and the changes in it in recent years have been so great as to indicate clearly the necessity for applying to radio administration some regulations that are in extension of the powers given the Secretary of Commerce under the 1912 law, and it subscribes to Secretary Hoover's plan of annual unofficial agreements within the art for that purpose so long as we have a hopeless radio law. All hands must admit that there is no other way out. The League believes that the agreements made at those annual conferences have a greater moral weight than would a claim to wholesale privileges invoked under the technicality that the 1912 law is still on the books. The amateur has fared well at those conferences; we have all the territory in the radio spectrum which we need, and about all to which we are morally entitled. Any amateur, therefore, who might be so foolish as to think that he can get away with operation on a wave length outside of the presently-authorized amateur bands is just begging for trouble—and it is very certain to hit him in the neck with a strength of R9.

Meanwhile there's a grand racket on in Congress about new legislation. In addition to the White and Dill bills, Senator Borah presented a somewhat similar bill providing

for regulation by an independent commission and containing very strong anti-monopoly provisions, so strong in fact that it is doubtful if the bill will find many friends. Then Senator Dill revamped his bill and now, instead of providing an advisory committee as proposed by Congressman White and in his own original bill, he has switched over to the idea of a governing commission, similar to the Interstate Commerce Commission, which would take radio control from the Department of Commerce and run it independently, reporting direct to the President. Nobody knows what is going to happen to all these bills. The Coolidge Administration wants the White Bill, with radio remaining under the Secretary of Commerce, with the commission and advisory one to the Secretary; the other bills are anti-administration. Politics is now controlling the situation. It will control both the choice of a bill and the decision whether there will be any action at all or not before Congress adjourns. This is election year and the boys are hot to get home and pass out the cigars. The fight over whether radio administration shall remain with the Secretary of Commerce or shall go to an independent commission promises to be a bitter one, and the best observers in Washington are of the opinion that nothing will eventuate before adjournment about early June. The League is studying the situation carefully to determine its action. It is sincerely to be hoped that matters have gone far enough now to impress upon the Fathers on the Hill the extreme desirability of early but well-thought radio legislation—but we doubt it.

—K. B. W.

WWV May Suspend Transmissions

WE are advised that the standard frequency transmissions from WWV may be suspended on the ground that the Radio Section of the Bureau of Standards feels that the work is no longer necessary. The Bureau feels that enough calibration services are now available so that WWV's work is less valuable than formerly, also that the coming of the crystal oscillator has reduced the need for WWV's work.

In view of the great enthusiasm with which 1XM's short-wave transmissions have been met this seems doubtful, especially as

there has just begun a movement to take greater care in the exact location of amateur transmitting wavelengths. The Technical Editor of QST feels that the loss of WWV would be serious. Furthermore, most of our sources of Piezo quartz crystals have just been closed, and very few laboratories are able to furnish accurate calibrations on our shorter wavelengths.

In view of these things it seems imperative that all A.R.R.L. members using the service from WWV notify the Bureau at once, sending a copy of the letter to the Technical Editor of QST. The Bureau may be addressed as, "Radio Section, Bureau of Standards, Washington, D. C."

—R. S. K.

Polarized Transmission

An Interview with Dr. E. F. W. Alexanderson*

By Robert S. Kruse, Technical Editor, QST

THE title of this paper, after the fashion of titles, is not exact for it suggests that ordinary radio transmission is *not* polarized. For the purposes of this paper, however, it is convenient to think of all radio transmission as being polarized, horizontally, vertically or otherwise.

As soon as that is said one automatically asks for the meaning of these terms; what does a vertically polarized radio wave look like—how does it differ from a horizontally polarized radio wave? Unfortunately it is practically impossible to draw pictures that will show the thing understandably, although one could make wire models to show it tolerably well. The best way of getting straight on the matter is to start with some familiar thing and work that to the polarized waves we are talking about.

Suppose that we consider the ordinary vertical antennas shown in Fig. 1a and 1b. At 1a we have a vertical Hertzian antenna suspended some distance above the earth. This antenna is supposed to have gone through several oscillations and is at this instant in the condition of having the greatest current at its center (at B). The shells surrounding it represent the *electrical field*. At the same time there is present a system of *magnetic whirls* about the antenna and these are shown at 1b. We will begin by calling this sort of thing a vertically polarized radiation, remembering that *both* the electrical field of 1a and the magnetic field of 1b are present at the same time, also that both are spreading in all directions, the diameter of the fields increasing with enormous speed. For instance the right hand edge of the magnetic field is rushing to the right at a speed of 300,000,000 meters per second.

The Electrical and Magnetic Fields

This point must be thoroughly straightened out before we proceed—we can *investigate* either the R. F. electrical field or the R. F. magnetic field but neither can *exist* without the other. The electrical field is sometimes mis-called the "static field" but that term is entirely incorrect for it means "stationary field" and is certainly not correct to speak of "static" fields when things are moving with the speed of light.

If that point is straight we can proceed to the reasonably plain statement that such

a combined field can be received (which means noticed) by means of either a loop or a Hertzian antenna. This point was considered in the paper on Dr. Picard's ex-

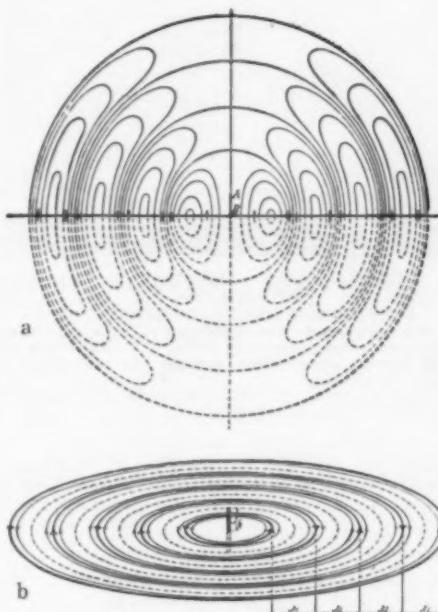


FIG. 1. THE FIELDS ABOUT A VERTICAL HERTZIAN ANTENNA
a—The electrical field, sometimes mis-called the static field.
b—The magnetic field.
Both are present at the same time and place; both are expanding with the speed of light.—Zenner-Seeling "Wireless Telegraphy".

periments in horizontal reception.¹ For convenience we can consider the loop as working on the magnetic part of the field and the Hertzian (straight rod) collector as working from the electrical field. This is shown in Fig. 2 which also shows the positions the two devices will assume for best reception near the sending station.²

Marconi Antennas

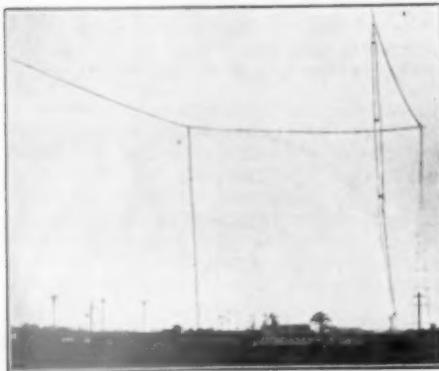
Now we have fairly clearly in mind the thing we call a "vertically polarized radiation," but we have been thinking of a

* Consulting Engineer, General Electric Company and Chief Consulting Engineer, Radio Corporation of America.

1. February 1926 QST, Page 9.

2. At a considerable distance from the sending station these results are modified as explained in Dr. Picard's article referred to above.—Tech. Ed.

Hertzian sending antenna such as that shown in Fig. 3a, neither end of the system being near the earth. When we use a Marconi antenna like that of Fig. 3b the lower half of the electrical field (the part dotted in Fig. 1a) will be missing, because



A VERTICAL AND A HORIZONTAL ANTENNA USED FOR COMPARISONS AT THE SOUTH SCHENECTADY DEVELOPMENT STATION

What appears to be a T antenna is really a horizontal Hertzian antenna fed by a 2-wire R.F. line which does not radiate appreciably—leaving the horizontal top alone to radiate.

Photos courtesy Mr. W. T. Meenam, Publicity Dep't., General Electric Company.

it is cut off by the earth. This may be thought of as meaning that the advancing wave "drags its feet on the ground," there-

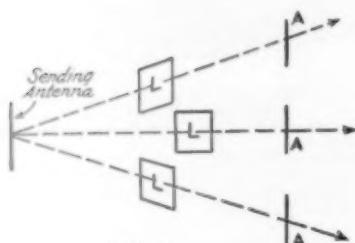


FIG. 2

RECEPTION FROM AN ORDINARY VERTICAL HERTZIAN ANTENNA

L L L Loops set for strongest signal.

A A A Small Hertzian receiving antennas set for strongest signal.

by wasting energy and slowing itself down a trifle. More of that later.

Effective Height

For years we have been using antennas that were grounded or else that had counterpoises rather close to the ground. These antennas were worked with more or less loading and under these circumstances (at

least if wavelengths of 300 meters or more were used) it was mainly the *height* of the antenna that mattered. Radio texts accordingly fell into the habit of stating that the vertical part of the antenna radiated while



FIG. 3 - ANTENNAS

VERTICAL ANTENNAS

- a Hertzian antenna which would have a field like that of Fig. 1.
- b Marconi grounded vertical antenna which would have the upper half of the field shown in Fig. 1 plus some earth current in the ground under the antenna.

the horizontal part (if there was one) did nothing but act as a loading capacity.

Very probably some of my readers have tried to understand this sort of statement and have wondered why it should be possible for a *vertical* wire with R. F. current in it to lose energy to the ether but the same wire placed *horizontally* (with the same sort of ether around it and the same sort of R. F. current in it) should suddenly be unable to lose energy to the ether. The explanation is simple—it isn't so. The texts did not state an untruth, they were merely careless in the way that they put their statement. What they meant to say

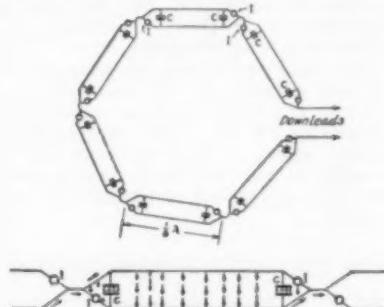


FIG. 4

CONSTRUCTION OF THE SPECIAL HORIZONTAL LOOP

C C C Condensers constructed as shown in photograph.

I I I Insulators breaking up each section.

The current flows thru the antenna as shown transferring from one wire to the other in each section. This series capacity neutralizes the inductance of the section at the resonance frequency.

was that with the sort of wavelengths we were then using and with the sort of antennas we were then using it was the vertical part of the antenna that produced the "distance effect." The horizontal part of

the antenna lost energy to the ether (radiated) also, but not in such a fashion as to have much useful effect at the receiver—in other words the horizontal wire did not contribute to the "distance effect" except by reason of the effect it had in causing more current to flow in the vertical wires—which is the capacity loading effect previously referred to.

Horizontal Radiation

Now it is not pretended that all texts were guilty of the statements just referred to but many were—and for that matter the statement fitted our old conditions—of

A—Loaded antennas.

B—Fairly long waves

C—Ground connection or fairly high-capacity counterpoise.

However as we went down as to wavelength a variety of peculiar effects began to be noticed. Some of us found, in tests with NSF, that some wavelengths could not be heard well close to the station but could be heard well at a distance. 1XAQ at Silver Lane, Conn., could not be heard at 1XAM, at S. Manchester, Conn., but got into Washington D. C. in good shape. We also found that wavelengths below 50 meters were quite likely to be *better* by daylight than by night. We began to notice all sorts of irregular effects. One of the newer of these effects has been that of receiving 40-meter signals *better* with a horizontal antenna than with the regular vertical antenna—as was explained in the article on Dr. Pickard's work. Here was reception with an antenna having NO "effective height at all"—a thing which should not work if the waves were traveling as shown in Fig. 1. As was explained in that paper,

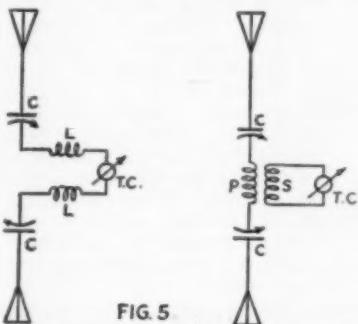


FIG. 5

CIRCUIT OF THE EXPLORING ANTENNAS
T.G. Thermo galvanometer.
C.C. Tuning condensers.

the only possible explanation was that the wave was either partly or wholly twisted around so that its axis was horizontal instead of vertical. Before this time a number of amateur stations had been sending

with horizontal Hertzian antennas (instead of the usual vertical or bent ones) and had been getting very decent results—which again was not in line with our notions on the ways radio waves act.

Dr. Alexanderson's Experiments

These facts seem to hitch together plainly enough now, but at the time everyone seems to have overlooked what was going

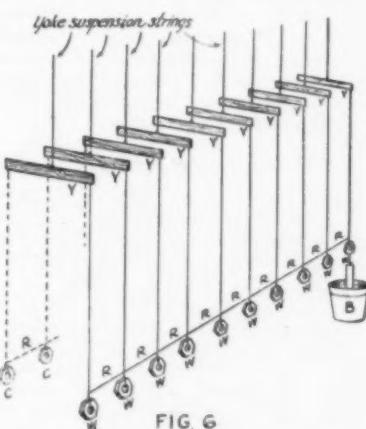


FIG. 6

THE POLARIZED WAVE MODEL

W W W
C C C
R R R
Y Y Y
B

Brass nuts representing particles of ether.
Brass nuts acting as counterpoises to remove effect of gravity.
Rubber bands representing the elastic attraction between the particles of ether.
Wooden yokes suspended to permit free vertical oscillations of W W W W.
Water bucket containing wooden paddle fastened to last weight. This water absorbs the wave and prevents it from being reflected back. The action is exactly similar to that of the resistance at the end of a Beverage wire.

on—namely that we were actually able to carry on 40-meter radio transmission and reception with sending and receiving antennas having zero "effective height," showing rather plainly that the waves were *not* traveling in the fashion suggested by Fig. 1.

Dr. Alexanderson's attention was called to these things by some effects which were noticed near the double loop antenna shown in one of our photographs. (Page 13) This antenna system was being operated for another purpose when it was noticed that the electrical field near the antenna was apparently of a "horizontally polarized" nature—that is it was possible to receive the signal with a loop laid down flat, in which position the loop will not pick up ordinary signals at all.

Work at different distances showed some additional peculiar effects and it was thought

worth while to put up an antenna system which would give out radiations almost entirely "horizontally polarized."

The Horizontal Loop

A special horizontal loop was built and tuned to 50 meters wavelength. This special loop is shown in the photograph on page 15. It will be seen that this is a very large loop for 50 meters. The size was made possible by the construction shown in Fig. 4. The series condensers are shown in the photograph (Page 13). The condensers are made of a pair of copper "cymbals" placed on a rod of treated wood or "mycalex" with a spacing of $\frac{1}{8}$ " between the flanges, giving a capacity of about .00035 microfarad (350 micromicrofarad).

Transmission Methods

With this antenna—or loop—a variety of peculiar effects was observed. To investigate these things still further a horizontal half-wave antenna was erected at the South Schenectady test station where it was occasionally used to transmit at 380 meters, using the regular WGY programs and getting reports on reception from broadcast listeners. In addition to this, various horizontal Hertzian half-wave antennas were put up in different places, these antennas being fed by 2-wire R. F. lines to make sure that only the elevated horizontal part radiated. At present there is also in operation a commercial station with a horizontal elevated Hertzian half-wave antenna fed by a 2-wire R. F. line. This station operates at approximately 16 meters wavelength and seemingly contradicts the skip-distance conclusions with regard to that wavelength. This station is located at "Radio Central", on Long Island, New York and with a power of about 10 K.W. handles commercial traffic to Monte



DR. ALEXANDERSON OPERATING POLARIZED WAVE MODEL

Grande in Argentina, about 18 hours per day. It can also be heard at some points

where there should be silence according to the skip-distance figures usually accepted.

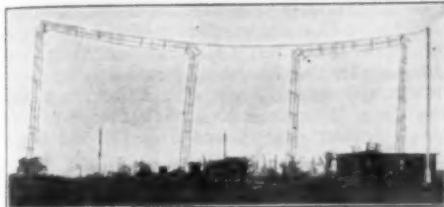
The various effects referred to above need some explanation and that explanation can be given most easily by considering one example—namely the special 50-meter loop shown in the photograph and in Fig. 4. This loop was operated during the writer's visit to Schenectady and Dr. Alexanderson was kind enough to give more than a day and a half to some field demonstrations of the things that had been found out. The field near the antenna was explored with some "exploring antennas" somewhat like those shown in the photograph with the same caption. Being of later type these "exploring antennas" used improved connections as shown in Fig. 5. The scheme of using these things is simple enough. One tunes the circuit at the center to the operating wavelength and then maneuvers the "exploring antenna" around until the meter shows the greatest deflection, at which time the length of the exploring antenna lies along the lines of the electrical field at that point. If the antenna field is quite powerful this operation does not distort it too much. On the day at which we explored the space near the horizontal loop the electrical field showed an inclination of 45 degrees to the right of the vertical as one faced the transmitting station. This can also be stated in another way—namely that there was a vertical radiation and a horizontal radiation of about the same strength and that the two were in phase.

Corkscrew Waves

The next thing was to show what happens when one goes away from the antenna. Of course the exploring antennas will not work very far away from the station, even though there are several kilowatts of antenna energy. Therefore a loop receiver was used for explorations at greater distances. This set, operated by Messrs. Rockwood and Snyder, is of sufficiently unusual construction so that it deserves description in a later issue of QST. For the present it is enough to say that it is a thoroughly shielded 4-tube job with one stage of R. F. amplification and interchangeable tuning systems—and so built that it can readily be calibrated and therefore used to give field strengths in microvolts-per-meter. Dr. Alexanderson now turned his car into a radio exploration car and took us to various points where the set could be used a little ways off the ground. Some of these points were on bridges, others at the edge of sharp drops in the surface of the state of New York—places where the waves probably would not be especially deformed by objects near them, before reaching the receiving set.

Quoting from a paper by Dr. Alexander—“The composite picture which was ob-

tained from this test was a continuously twisting plane of polarization with alternate points of plane and circular polarization.

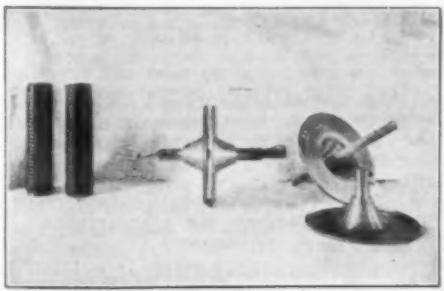


DOUBLE LOOP ANTENNA

The source of horizontal radiation was first suspected when this signal put strong signals into "Radio Central" on Long Island although ordinary receivers near the station showed no response.

The plane polarization was indicated by sharp direction bearings while circular polarization was indicated by equal intensity from all directions. The observations indicating plane polarization sometimes gave bearings toward the transmitting station and sometimes at right angles. Besides these measurements around the vertical axis other observations were made with the loop in the horizontal plane. On flat fields the horizontal position gave nearly zero response. At the top of a steep hill and a high bridge the response in the horizontal plane was equal to the vertical. These results indicate the presence of a horizontal and a vertical wave component WITH DIFFERENT VELOCITY OF PROPAGATION.

Whenever the two waves (H & V) are in phase, they give plane polarization. When they are 90 degrees out of phase they give circular polarization. The observation with



TUNING COILS AND CONDENSERS

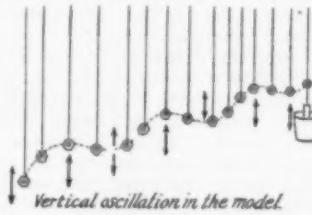
The tuning coils are used in the downleads of the multiple-tuned antenna shown in another picture. The condensers are used in the multiple tuned antenna, also in the special horizontal loop and other special antennas.

the loop in the horizontal position on the top of the hill and the bridge show that even a moderate elevation is sufficient with short waves to reach the point where the hori-

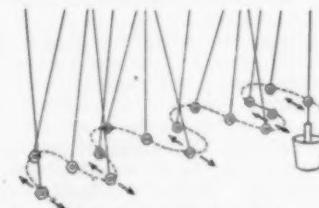
zontal electromotive forces are not short circuited by the ground.

Making the Corkscrew Wave Visible

Again we have arrived at a point where we would like to have a picture of the thing we are talking about. This time the thing is possible—the picture can be shown. The newspapers have made familiar the apparatus shown in our photograph, "Dr. Alexanderson Operating the Polarized Wave Model" but have not furnished much of an explanation of its action. Unfortunately the photograph shows very little of the apparatus which is therefore shown in the sketch Fig. 6. Here the weights W W W W W represent small portions of the "ether" we transmit through. Now these particles are supposed to hang in space but to be free to oscillate to some extent in any fashion, always being drawn back to their normal positions as if they were suspended in a rubber sponge or a jelly. It is therefore necessary to make the brass weights have inertia—which they naturally have—but to keep them from falling. Each weight is accordingly hung by a string from a light wooden yoke on the other end of which is hung an exactly



Vertical oscillation in the model.



Horizontal oscillation in the model



45° oscillation in model

FIG. 7
EFFECT OF SENDING VARIOUS KINDS OF
WAVES ALONG THE MECHANICAL
ETHER-MODEL

similar weight C C C C C which is merely a counterpoise or gravity neutralizer. Thus each of the weights W can oscillate up and

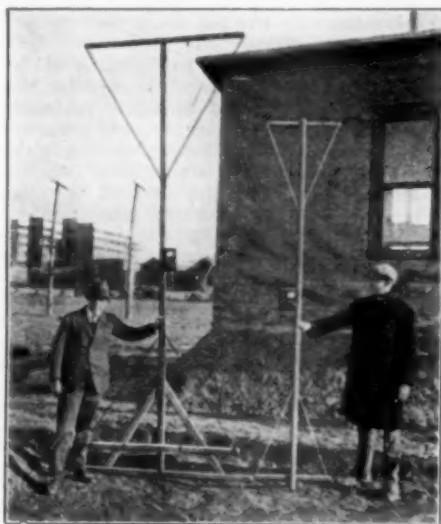
down by rocking its yolk or can swing back and forth in any direction (because it is hung on a string). We have now made the weights free to oscillate in any fashion, just as can our theoretical particles of "ether". "A screen is set up so as to hide the counterweights and avoid confusion in observing the wave motion." To complete the model it is only necessary to imitate the elastic connection between the particles of "ether" and this is done by connecting the weights W W W W by means of rubber bands, R R R R R. There are 22 weights altogether, making a series long enough to observe the effects that have been tested in actual transmission by radio.

Dr. Alexanderson demonstrated the action of the model to the writer and explains it as follows.....

"We will assume that the medium through which the radio waves pass has such characteristics that the velocity of propagation for a vertically polarized wave differs slightly from the velocity of the propagation for a horizontally polarized wave. It is not necessary for the present purpose to try to explain the reason for this difference in velocity. We may assume that the reason for it is the electro-static or magnetic earth-effect or a retarding effect due to the closeness of the earth. Whatever the cause may be we may assume that such a difference of velocity exists and the mechanical model has been constructed so as to reproduce such conditions. The weights on both sides are tied together with rubber bands. Wave motion in the horizontal or vertical planes can thus be studied independently and these two wave motions may be adjusted for different velocities. A wave started in the vertical plane maintains itself vertically and a wave started horizontally maintains itself horizontally—(See Fig. 7.). If, however, a wave is started in a plane 45 degrees between the V. and H. it is found that the wave motion proceeding therefrom assumes the shape of a spiral. (See photo of model.) The straight-line oscillation of the first weight is passed along as an elliptical motion which gradually (as it passes successive weights) widens into a circle. Then this circle narrows down again (as it passes still more weights) to an ellipse and finally a straight line at right angles to the original line of oscillation. (See Fig. 7.) This is exactly in accordance with the theory. The point where the wave has shifted its plane of polarization 90 degrees, is the point where the faster of the two waves is half a wavelength ahead of the slower wave. From this point on the wave proceeds, repeating this peculiar spiral motion. The fact that the twisting of the waves is due to different velocities in the two planes of polarization can also be demonstrated by this model. For this purpose rubber bands are added to the counter-

weights. The effect of this is to change the velocity of propagation in the vertical plane whereas the velocity in the horizontal plane has not been effected because only the vertical motion is transmitted to the counterweights by the suspension yokes. The system can thus be adjusted so that the velocities in the horizontal and the vertical planes are exactly equal. After this has been done it is found that the tendency to spiral motion disappears and the wave remains strictly in the plane in which it has started.

While this mechanical experiment does not bring out any facts that were not known



EXPLORING ANTENNAS. THE CIRCUIT FOR THE LATEST TYPE IS SHOWN IN FIG. 5

from the classical theory of wave motion it helps us to visualize the main phenomena in the radio wave propagation which we are trying to explain. The phenomenon of constantly shifting plane of polarization which we discovered experimentally in the tests between Schenectady and Long Island can thus easily be explained. This conception of the wave motion is also a help in explaining the phenomena of fading. There is much experimental evidence that fading is a phenomenon of wave interference. In other words the fading is due to the fact that the radio waves arrive at a certain point through two paths. The waves will sometimes add to each other and sometimes neutralize each other (more or less completely). If we keep in mind the observations on the mechanical model to the effect that the waves in two planes can be traced through separately and distinctly we may

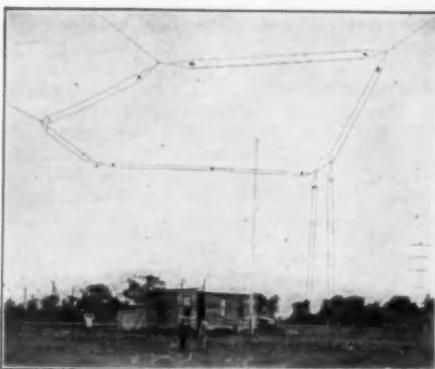
conclude that the two paths of the radio wave which produce fading are not necessarily two separate physical paths but may be the two paths in the horizontal and the vertical plane of polarization. It is not hereby suggested that his mechanical equivalent is sufficient to explain the fading in actual radio transmission. It is offered for whatever it may be worth as a help to interpret the many observations in actual radio transmission which are being accumulated."

The Practical Effect

There are some things in radio that need explanation but which do not have such explanation at present. Dr. Alexanderson suggests that the irregularities of radio compasses (especially at sunset and sunrise), the failure to obtain a proper line of direction on an airplane which is sending with a trailing antenna and flying at a direction other than straight to or from the compass, the failure of these seeming errors of direction to show up when receiving with a Beverage wire—that all these things can be recognized as being the characteristics of waves partially polarized in a horizontal sense.

"The observation that the wave seems to come straight down from above (compass

case there is no direction indication, and the wave appears to come in from above this is also an illusion.



SPECIAL LOOP FOR SENDING HORIZONTALLY POLARIZED WAVES

The construction is shown in Fig. 4. The double downleads neutralize each other, leaving only the top to radiate. Current rush around this top in one direction and then in the reverse, producing a circular "drag" on the ether. Directly under the center of the loop (where Dr. Alexanderson is standing) there is no effect on the exploring antenna. The masts are of wood and the supporting ropes of tarred hemp to prevent distortions as far as possible.



FIG. 8

THE CONNECTIONS OF THE MULTIPLE-TUNED ANTENNA SHOWN IN THE PHOTOGRAPH
C C C Condensers coupling the different sections.
L L L Tuning coils for adjusting the sections to operate in phase.

Note that the system acts as if it consisted of a number of T antennas end to end, each one having an inverted T counterpoise. The end section in this case is of L form, though it may be of T form. The currents in all downleads are in phase and practically equal although energy is fed to only one.

can be rotated about usual vertical axis without effect on signal) suggested an explanation that wave components radiated directly upward had been reflected down by the Kennelly-Heaviside layer. This explanation seems however less likely in view of the other facts to be considered. Putting all these facts together it seems now that the old observation on the long wave, the airplane and our recent work on the horizontal loop can all be explained as a characteristic behavior of the horizontally polarized wave. In all three cases the wave appears to come in from unexpected directions but actually it does not. When in the third

The question is: what really does happen? This is a problem on which the experiment with the mechanical model can throw some light. We must for this purpose return to the idea that the radio wave is a mechanical wave motion in the elastic medium ("ether"). In the model the weights represent the mass and the rubber bands the elasticity of this medium and the vertical as well as horizontally polarized wave can easily be reproduced, but when we are to imitate a wave motion over the surface of the earth, we must also in some way imitate the presence of the earth. The earth is a conductor and therefore the elastic strains represented by the rubber bands cannot exist in the earth. Displacement currents in the electrical medium can, on the other hand, induce conduction currents in the earth. These currents are electrons in motion which can be represented by weights which are not tied together by rubber bands in the horizontal plane, whereas they are electrically associated with the electric medium above. To imitate this condition, additional weights may be hung from the weights W W by vertical rubber bands so that they are elastically associated by the wave medium but are not connected to each other. If now a horizontally polarized wave is sent through this system it is found that the wave motion is propagated to the vertically suspended weights producing elastic strains in the vertical rubber bands. We must now re-

member that the elastic strains represent E.M.F.s, and these strains so produced are of the same character as if they were a part of a vertically propagated wave motion. Actually no such wave motion exists and these strains are only the electromotive forces which produce currents in the ground!! A receiving loop set broadside to the advancing wave will not collect energy but the ground currents produced by the wave will put energy into the loop. The test for horizontally polarized transmission near the earth then becomes the ability to receive with a loop set broadside to the advancing wave—at right angles to the direction of the station. If this theory is correct the effect should disappear at some distance above earth and the horizontally polarized wave should show a line of direction if observed—for instance—from an

means that the irregularities of direction finder indications recorded on long waves



THE FIELD SET IN ACTION

Dr. Alexanderson is standing at the right. The loop is being maneuvered by Norman Snyder. The half-frozen person illustrates the way a Hartford citizen feels in up-state New York, Spring weather.

Photo courtesy Mr. Rockwell.



A MULTIPLE TUNED ANTENNA FOR SHORT WAVES

The connections are shown in Fig. 7. This type of antenna is also referred to as the "infinite velocity type" since the energy fed to one downlead appears in the same phase in all the other downleads. Note the condensers and inductance coils which are shown also in another photograph.

airplane. Using short waves the necessary distance from the earth can be gotten with apparatus as simple as a 60-foot wooden telegraph pole and this sort of test has been made at Schenectady. The results seem to confirm the suggestion just made. It is hoped that it will be possible to make airplane tests.

Concerning Long Waves

"Direct observation of horizontal polarization at long waves could be made only at great heights but indirect observations through the effect of ground currents can be made by ordinary direction finders at any wavelength. If this theory is correct it

can be explained by the presence of horizontally polarized wave components."

The Various Velocities

Some of my readers will doubtless be troubled by the suggestion that there are several speeds of travel for radio waves. We have become used to thinking of a fixed speed of 300,000,000 meters per second—or more correctly 299,820,000 meters per second. We know, however, that there are such effects as reduced wave velocities on wires, as is seen in the familiar Beverage wire where the advancing wave is able to build up the energy in the wire for only a certain distance and then gets ahead of the "wired wave" so that a longer wire is of no further use and a great increase in the wire length will actually result in a decreased signal. The reverse thing happens in the Alexanderson "Multiple-Tuned Antenna", such as shown in one of our photographs and also in Figure 8. Here the energy is fed into one of the downleads yet the currents in all the downleads are in phase if proper adjustment is made. Another way of looking at this is that an electrical wave motion has been sent through the system *instantly* so that it is at all downleads at once.

In this way one can see that the speed of waves in free space is one thing, while their speed when associated with a conductor is another thing entirely. This makes it seem quite plausible that horizontal and vertical polarization may produce different wave-speeds since they are not associated with the earth in the same degree.

Of, By and For the Beginner

By J. T. McCormick*

THIS article is meant for beginners and is written by a beginner. Old Timers who need a good laugh are welcome. Come on in!

The writer (the beginner of the first part) has had poor luck in securing advice from old timers. They have tried hard enough, goodness knows! The difficulty lies in their not getting the beginner's point of view. Beginner's problems simply are not problems to the old timer—and there you are!

I recently began to "get out" with my first little "peep peep" station. I believe that an account of my experience in "getting on the air" will prove rather helpful to the fellow who is just a jump or two behind me.

My first crystal set worked "right off the bat" but my first transmitter has, er—taken some of the conceit out of me. Before receiving my license, I knew everything—yes, everything! I had built a neat little outfit, transmitter and receiver combined, somewhat as it appears in the photographs, but not quite! Changes have been made.

Trouble Begins

The original transmitting hookup was a master-oscillator power-amplifier affair, using a 96-volt storage B-battery for power supply. 201-A tubes were used. I fondly hoped to neutralize this thing on forty meters! I suppose it could have been done by using enough shielding, time and, possibly, separate batteries for each tube. I did not have sufficient patience, however. Neutralization not being entirely necessary, it remained unneutralized.

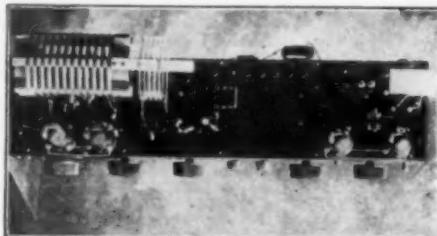
My license finally arrived and I set out to "knock 'em dead" with low power. I had no meters and so was using the usual flashlight bulb to indicate resonance in the antenna circuit. I had no difficulty in tuning the plate circuit of the power amplifier to resonance with the master oscillator. A flashlight bulb shunted across the antenna pick-up coil did the trick. When I tried to tune the antenna to resonance, however, I ran into difficulties. I did not have enough antenna current to light the bulb. I had forgotten the radiation resistance!

I finally conceived the idea of placing the bulb in the tuned plate circuit of the power amplifier. The bulb, by the way should be inserted in the lead going from the variable condenser to the plate of the tube. If it is placed in the other condenser lead, the current is too great and it will burn out. When the antenna circuit was then tuned more or less to resonance the bulb went out.

Simple! The bulb was then short-circuited by means of a switch provided for that purpose. Fine! I now knew, at least, that I was radiating *some* energy.

Next, I wanted to know what my station sounded like on the air. I tuned my receiver to forty meters. There was nothing but a "swish" to indicate that my transmitter was oscillating. I had expected this, however. The transmitter oscillations being comparatively strong, the receiver was drawn into unison with the transmitter. I next tune the receiver to twenty meters. Ye gads! the wave was afflicted with St. Vitus dance! I loosened the antenna coupling. Much better! I loosened it still more.

I next made a discovery. I listened on eighty meters and found that the wave seemed much steadier than when I listened on twenty. A little thought solved this mystery. For every change in frequency made by the transmitter its second harmonic goes through a change of frequency twice as great. When I listen on twenty meters I was listening to the second harmonic of my transmitter and things sounded twice as bad as they really were. When listening on eighty meters I was listening to the



TOP VIEW SHOWING THE VARIOUS SWITCHES REFERRED TO IN THE DIAGRAM

main wave of the transmitter with the second harmonic of my receiver.

All this sounds as if I had been holding the key down for hours. Not so. I believe that a fellow ought to have some sort of an idea as to what he is trying to find out before he starts to test. If I do not hear what I want to hear within a minute or two, it is time to "shut 'er off" and think it over again.

I next tried working the key. Another problem! My note had a terrible "tweet". By "tweet" I mean that the wave "skidded" every time I pressed the key, so that I heard only the dots and the beginning of the dashes or else heard only the tail end of the dashes—depending upon how I tuned

* 9BHR, 1221 Monroe St., Topeka, Kans.

the receiver. I knew, in a general manner, the cause of this, but try, as I might, I could not eliminate that "tweet". It seemed that the tube impedance began to change the instant the plate current started to flow and continued to change for a considerable fraction of a second. While the tube impedance was changing, the frequency was also changing. I did not try to "work" anybody. No one could have read such a note—though lots of folks never seem to think of that.

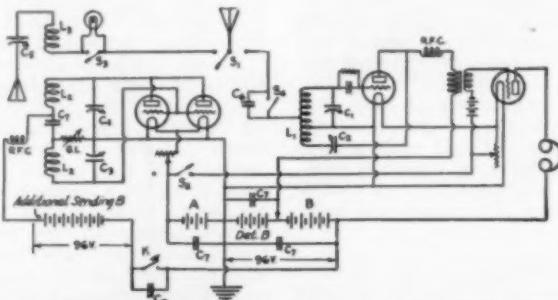
A Simpler Set

I suppose I should have "stuck to my bush", but I did not. I decided to work with something simpler and so discarded the whole master oscillator scheme.

I had been using a C-battery in the old hook-up and continued to use it in the new one.

Grief and more grief! The same old "tweet" persisted. Moreover, I now had no means of tuning my antenna to resonance. I decided to light up that antenna "ammeter" or go broke. I went to the nearest radio store and spent thirty dollars for another 96-volt storage B-battery and two dollars for a Bradleyohm to serve as a grid leak.

Glory be! My "ammeter" lit! The variable leak eliminated the "tweet". When the leak was properly adjusted, my note began to "toot", as it should, instead of "tweeting". If you do not understand what I am trying to say about "tweeting" and "toot-



THE TRANSMITTER-RECEIVER DIAGRAM OF CONNECTIONS

- C1 Tuning condenser for receiver secondary.
- C2 Feedback or regeneration condenser of receiver.
- C3 and 4 transmitter primary tuning condensers. These really should be the two halves of a double condenser.
- C5 Antenna-tuning condenser of the transmitter.
- C1, C2, C3, C4 and C5 are all receiving-type condensers with plates of a shape to give an approximate straight-line of setting against frequency. Their capacity is about 250 micromicrofarads each, though that can be changed to suit one's personal notions as to proper tuner ranges.
- L1 Receiving tuner coil—in this case having 18 turns on a 3-inch diameter with a filament tap at the 13th turn and an antenna tap at the 12th turn. Other coils can be used for other wavelength ranges.
- L2 The split sending helix, best described by the photos.
- L3 The antenna helix, 5 turns of No. 14 cotton-enamelled wire.
- S1 and S2 The two blades of the send-receive switch, which may be seen on the top of the cabinet in the photographs. The blade marked S1 transfers the antenna while the blade marked S2 cuts off the receiving filaments whenever the switch is on the sending side.
- S3 Antenna-lamp shorting-switch, to be seen on the top of the set in the photographs.
- S4 Switch to short out small fixed condenser in series with the antenna. Opening or closing this switch shifts the antenna tune and avoids difficulty in making the receiver oscillate. This switch can be seen on the cabinet near the receiving coil.
- The condenser C6 may have a capacity of 250 micromicrofarads (.00025 microfarads) or thereabout.
- All the other small fixed condensers marked C7 may have any capacity above 300 micromicrofarads (.0003 microfarads).
- K—Key.
- RFC Conventional R. F. choke of 1" diameter with single-layer winding of finest wire available—no bigger than No. 30.
- GL Variable gridleak—a fixed one may be used.

I chose the series-feed balanced Colpitts circuit popularized by Hoffman of the Burgess Laboratories and used in the set which was built for the Wilkins north-pole expedition. This hookup was simple and would use all three of the variable condensers which were already mounted in my outfit. I did not use a grid leak, however.

ing", listen to the crystal control stations—they "toot".

I was now nearer than ever before to having a real station, but was still far from the goal. The wave was swinging much worse than had been the case when using the master-oscillator power-amplifier arrangement. I loosened the coupling until it looked

actually foolish. The swinging was improved by this, but not nearly enough. My next act was to give the neighboring BC1s a treat. I went out and guyed my aerial and counterpoise at short intervals with cotton string. (If you laugh, it shows that you don't know anything about "forty meters", so there!)

I tested again. Eureka! The wave was not entirely steady, but was good enough to try. Now to work someone! Anyone! I was really not very confident of the result. An interval of two months or so had elapsed by this time since receiving my license. Little things—such as continuous failure—have a way of undermining a fellow's faith.

I spent the remainder of the afternoon and evening trying to "raise" somebody. I called CQ (properly); I answered other fellows' CQ's, but without response. It was finally time to go to work (I work at night) and failure was still mine. (No sleep that day, of course.)

All night long, while at work, I pondered over the problem. I remember what the old-timers have told us so often—that the amount of antenna current is no indication of how well we are getting out. I had noticed, while adjusting the set, that oscillation did not seem to be very strong at the high frequency end of the forty meter band. I had supposed this to be due to the peculiarities of the choke coil—or some such thing. I now viewed the matter in a different light. "Perhaps," I thought, "oscillation is just as strong at this end of the band as at the other, but the antenna current is less because of increased radiation resistance!"

The following day I tuned the set as near to the short wave end of the forty meter band as I dared. It was necessary to couple the antenna coil closely in order to find resonance, afterward loosening the coupling until the wave was sufficiently steady.

Success at Last!

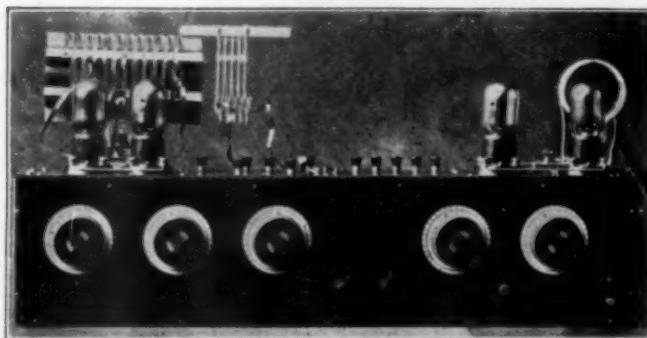
9CFN was on the air. I called him with as much outward confidence as if I was in the habit of working the antipodes daily, but I had an inward conviction that my signals were having a struggle to cross the county line. I threw the switch to the receiving side—expecting nothing.

I want to tell you, fellows, that the sound of my own call letters zipping through my phones was the sweetest music I had ever heard in my life! I shall never forget it during the rest of my days. The music in Heaven will doubtless prove to be a distinct disap-

pointment to me, provided, of course, that I—

Habit kept my pencil going, but my thoughts danced about in chaotic ecstasy. (I am getting poetic, but dang it! I have to express myself, don't I?) 9CFN had finished and was waiting for my answer. I grasped the key. Something was wrong! It had turned into a "bug" key! I sent a string of dots at about sixty per. Perhaps I was nervous. I tried using both hands. This only made it twice as bad.

Horrors! I could not answer him! I wept and overturned my chair in excitement. My wife came running—convinced that lightning had struck the shack at last! She found me leaning weakly against the



FRONT VIEW OF THE TRANSMITTER-RECEIVER

From left to right the controls are, the two primary-tuning condensers of the transmitter, the antenna-tuning condenser of the transmitter, the rheostats of the sending and receiving sets respectively, and finally the receiver tuning and regeneration condensers.

wall, gasping for breath. I grinned an idiotic grin. "Gosh! Mom", I sputtered, "I worked a fellow!"

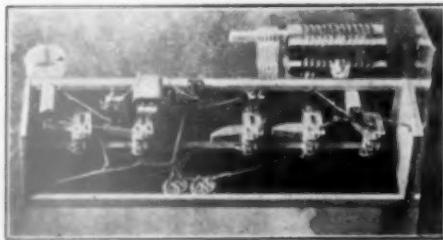
Sure, go ahead and laugh, but see what happens when *you* work *your* first station.

I was working too near to the edge of the forty meter band to be absolutely sure that I really was inside of it. Therefore, I went out and added a few feet of wire to my antenna for the purpose of increasing the radiation resistance in the middle of the band. I intend to stick right there—in the middle of the band until I know my "stuff" better.

After working a few stations, I made another discovery. I found, while testing for "swinging", that a goodly portion of the unsteadiness was caused by my wife walking under the electric light fixtures. Experiment showed that the signal disappeared completely when the fixture was actually touched with the hand. This was true of any fixture in the house—and I lived in an apartment house! I solved the difficulty by establishing a local "ground" for the lighting circuit by grounding it through a condenser taken from a Ford Coil. This is as good as an actual ground so far as radio frequencies

are concerned and it will not blow your fuses if a plug happens to get turned around.

I worked more stations. By the time I had worked an "8", nearly a thousand miles distant, I was growing more and more proud of my outfit and more and more ashamed of my operating ability. Learning the code and the Q signals does not make an operator. My station has been "off the air" for some



THE SET ROLLED OVER FORWARD SHOWING THE GENERAL CONSTRUCTION

time. At present, I am just listening to the other fellows while I try to learn something about good operating-practice. Try to learn something about operating while you learn the code, fellows, it will save you time and embarrassment.

The Transmitter-Receiver Combination

My outfit, taken as a whole, probably will not appeal to many of you. It contains some ideas, though, that are worth passing along. The most outstanding feature is the "top-panel" idea.

I had never liked cabinet sets. Parts are usually too crowded and many things which should be accessible are far from being so. Bread-board sets have the disadvantage of being hard to keep clean—variable condensers especially.

The "top-panel" arrangement solves these difficulties. Condensers are under cover, out of the dust, and there is no danger of their adjustment being spoiled by accidentally striking the rotor plates. The top panel provides a place to anchor your variable condensers when setting them back from the front panel—and they should be set back. Merely grounding the rotor plates is not sufficient on the short waves. Condensers should be set back and provided with an extension shaft made of some insulating material. I use celluloid knitting needles. (They call 'em "amber"). These needles are sufficiently flexible to take care of any slight misalignment. The metal dials shown are not grounded. They are allowed to "float free".

Coils, tubes and sockets are out in the open where you can get to them. Necessary controls, such as switches, grid leaks etc., are accessible and yet are not on the front

panel where they would cause body capacity effects.

The bulk of the wiring is out of the way beneath the panel so that the set is easily kept dusted by means of a soft paint brush which is kept on hand for that purpose.

All parts are held high above the table and are fastened to the rubber panel—a good dielectric. Rubber panels are O. K. if care is taken to so locate the set that the sun never shines directly upon it.

Square wooden end pieces and wooden strips to re-enforce the panel edges form all the "cabinet" that is necessary.

The combination of both transmitter and receiver in one unit may be considered to be a poor idea by some, but I like it. My old short-wave receiver being a makeshift affair, it was necessary that I build a new receiver when I built my transmitter. By combining the two, I saved time and expense. No matter what kind of transmitter I eventually keep for regular use, this outfit will always serve for emergency use. Since it operates from the same batteries as the receiver, it is always ready.

One of the little "kinks" in the set is the use of glass eye-cups to support the inductances. These cups may be purchased at the corner drug store. They are fastened to the panel by means of three brass machine screws placed in a circle about the base of the cup. The receiving inductance merely rests in the hollow of the cup, four leads being carried to four binding posts on the panel. A plug-in arrangement would be handier. The primary transmitting inductance is lashed to its cup with cotton thread. The secondary (antenna coil) supported by the primary, being held in place by rubber bands.

This secondary coil is wound with number 14 cotton-enamel wire over six celluloid strips. (Larger wire would be better.) The primary is wound with copper ribbon taken from a Ford magneto. The construction has been previously described in *QST*. The same copper ribbon, slightly twisted, is used for flexible leads. It is also used for all the wiring in the radio frequency circuits of the transmitter.

Most of the parts used came from the "junk box." Two of the dials came from a "defunct" super-heterodyne; three from a neutrodyne. That is how the transmitter happens to be equipped with vernier dials. Straight-frequency-line condenser are, of course, unnecessary in a transmitter, but this type happened to fit best into the mounting scheme. A great deal of cheap apparatus has been used. Cheap parts are sometimes good, but it is always good policy to "work them over" because they are usually carelessly assembled.

The diagram shows the manner in which the same batteries are used for both transmitting and receiving. Placing the key in

the position shown eliminates much unnecessary switching. In fact, no switches at all are needed if a separate antenna is used for receiving—although you may find the clicking of the key in the 'phones too annoying.

Two switches are necessary if the same antenna is used for both transmission and reception. These two switches are shown separately in the diagram for the sake of simplicity, but are in practice, combined in the form of a D.P.D.T. switch. S2 prevents the receiver from howling when S1 is thrown to the transmitting side.

The filament current is left turned on in the transmitter at all times to keep the set from being off-wave when first starting transmission. When it is desired to have both transmitter and receiver operating simultaneously for testing, the switch is thrown to the transmitting side and S2 is short circuited by means of a spring filing clip, such as is used in office work.

Please take note of the switch which shunts the flashlight bulb in the antenna circuit. Even if the resistance of this bulb was constant, we would not want it in the circuit. The resistance, as you know, increases as the filament heats and this, alone, will put a serious "tweet" in the note.

The conductive coupling used in the receiver is undesirable if you are bothered with local interference. Capacitive coupling can, of course, be used without adding additional coils, but I find that its use either gives diminished signal strength or else cuts down the tuning range of a given coil—depending upon the amount of capacity used. Loose inductive coupling is probably the best. In case you wish to use the conductive type, remember that a little goes a long way. One fourth of one turn is more than ample on forty meters; one turn is more than enough for eighty, etc.

I have but one antenna, a forty-meter affair (more horizontal than vertical), which is used for all wavelengths in receiving. This means that thirty turns of primary are necessary for broadcast reception—which is unsatisfactory, even then. A push-pull amplifier is plugged in in place of the 'phones and a loud speaker added when the need for music is felt.

The two binding posts at the right on the front panel are used for attaching the key instead of using a jack. A jack sometimes provides an uncertain contact. In the key circuit, the loose connection is not instantly discernable, as is the case with a 'phone jack. The 'phone jack, by the way, would be better located if placed farther to the left. The 'phone cord is eternally in my way when copying.

Battery leads should be cabled. A closed loop, formed by these leads, can absorb a lot of energy. If the A negative lead goes to a rheostat, carry the A positive right

along with it and right past the rheostat. Long battery leads sometimes cause howling on the shorter wavelengths. The remedy is to shunt all leads with fixed condensers at the set.

Any conclusions that I may make should not be taken too seriously. They should be taken for what they are—the conclusions of a newcomer in the transmitting game.

I believe that a beginner should start with low battery-power, not because that happens to be what I am doing, but for real reasons. Such an outfit may be harder to get into action, but that only means that the beginner will learn things now which will have to be learned sooner or later, anyway.

A beginner starting with a lot of power and a raw AC note is going to spoil the fun for somebody. The power will provide plenty of key-clicks to annoy the BCLs and the rotten note is going to keep some other fellow from working DX or building his message total. We are green, fellows, and we may even get off of our legal wavelengths and interfere with some other service. That means trouble for everyone.

I think that the majority of the old-timers are glad to have us come into the game. Let us do everything possible to help them keep that attitude. We are going to be old timers ourselves some day.

HOT DOG! I'M RADIATING
A HALF-INCH BLISTER!



ECU HAVING NO RADIATION
METER ADJUSTS HIS FIVER
UNTIL HE GETS THE BEST

BURN

Strays

When old Fred Schnell left Hartford we thought that the call, 1MO, would leave us too. Not so. Miss Dorothy Menk, formerly Fred's "secretary," and now Heavy Man to Handy, is a full-fledged ham operator, and she was tickled pink when the supervisor gave her 1MO as a station call.

High Adventure in the Northland

This Summer's Arctic Expeditions Depend on Short-Wave Amateurs For Their Contact With Civilization

ABOUT the most interesting thing in short-wave radio this summer is the several Arctic expeditions racing to be the first to visit the Pole by air and the first to explore the vast unknown area which lies between Alaska and the Pole. Chief among these are the Detroit Arctic (Wilkins) Expedition, the Byrd Expedition, and the Amundsen-Ellsworth Expedition.

It takes so long between the time a story is written for a monthly magazine and the time it reaches the reader that it is almost hopeless to present an interesting account of developments, but there are things about the radio activities of these expeditions which are of the highest interest to us, so we shall try.

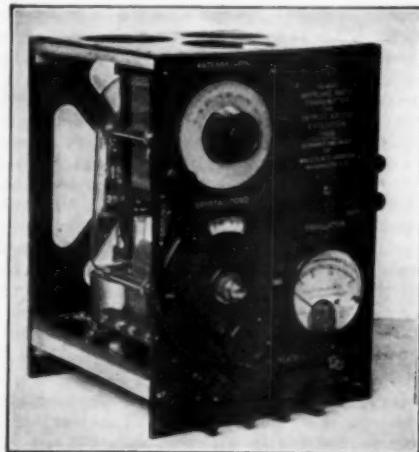
The Wilkins party has continued to have its share of thrills. Their overland party, with Waskey as radio operator, finally reached Point Barrow on April 26th after a heart-breaking trek of 600 miles, which took them seven weeks. Believe us, Bob Waskey will know he has been someplace when he gets home! The party ran short of grub and had to shoot some of their dogs, either because they could not feed them or, one report had it, because they had to eat the dogs for food. Finally they succeeded in killing enough game to revive both men and dogs (the dogs that were still alive, we mean) and pushed on. The gas-engine generator for the permanent set at Barrow (ex-NRRL) however was abandoned 160 miles out of Barrow, and a special fast party is being sent out from Barrow to retrieve it. Then there will be real communication down to the States, and something we can all listen for.

During the overland party's seven-weeks mush, Waskey was in communication almost every night with Mason, back in Fairbanks, using the little battery-operated set which Mason had built, on a portable aerial. This set has two 201-A tubes, supplied by Burgess batteries. It is certainly wonderful the way those batteries lasted, particularly in the temperature of 35 below. The marvel is not that Waskey occasionally failed to get thru but that his set did so well over a length of time much greater than planned on.

Meanwhile Wilkins has been freighting gasoline and supplies between Fairbanks and Barrow in the small Fokker, carrying the Hanson-built radio set. On his third trip the radio went out after three hours and nothing more was heard of Wilkins for two weeks, while an anxious world wondered about his fate. We learn that he burnt out

his wind-driven generator and so was unable to communicate. He arrived at Barrow safely but that night the tent hangar burned down, damaging the propeller of the plane so badly that two weeks were required to repair it with the limited facilities available. When the overland party was known to be approaching, a fast sledge was sent out to get Waskey and his set and bring them into Barrow in advance of the main party, and it was through Waskey and his little set that the world first learned that Wilkins was safe!

At this writing the big 3-engined Fokker is ready to shove off from Fairbanks, and then Mason will move to Barrow too, contact thereafter being from the main station at Barrow either to Fairbanks and thence



THE AIRPLANE TRANSMITTER built by Malcolm P. Hanson for the Detroit Arctic Expedition. It has a power of 50 watts, is crystal controlled, and weighs but 7 lbs. complete with tube and crystal.

by cable, or, if conditions permit, direct with U. S. amateurs, particularly 9EK-9XH. For his communication with Waskey, Mason has been using the Burgess-built portable set described in our columns, and this set probably will be installed on the big Fokker when it leaves Fairbanks.

Mr. Malcolm P. Hanson, ex-9XM, has kindly supplied us with a description of the airplane set he built for the smaller Fokker, and which on the first two round-trips to Barrows provided constant contact with Fairbanks, 560 miles air-line. This is a 50-watt crystal-controlled set, operating on

46 and 61 meters (6518 and 4915 Kc). A wind-driven generator supplies 10 volts for the filament of a UV-203-A and 400 volts for the plate. Low voltage must be used because of the limitation placed by the crystal, but a heavy plate current may be drawn and an output of 30 to 35 watts is obtained. A hand-driven gear arrangement with a speed ratio of 50-to-1 is also provided for emergency driving of the same generator in the event of a forced landing and engine failure. However, it is all one man can do to supply the power for a 50-watter for one minute with this arrangement, and so for such emergency communication a UX-210 7.5-watter with a 50-watt base is carried. The set is keyed in the C-battery line of the grid circuit, and is inductively coupled through pancake inductances to the aerial circuit. When operating on the ground, on an aerial suspended from the wing-tip, an aerial condenser is used and the coupling is adjustable; in flight, however, the coupling is tightened and no condenser is used, the aerial being tuned by adjusting the length of the trailing-wire antenna. The antenna ammeter is located in the hollow center of the antenna reel. This set is $9\frac{1}{4}$ " high, $7\frac{1}{2}$ " wide, $6\frac{1}{2}$ " deep, and weighs but seven pounds with tube and crystal. The complete installation, with generator, emergency hand-gear and three spare antenna weights, weighs 58 pounds. Many very nifty constructional features are embodied in the set, which we regret space does not permit us to describe in more detail. We understand that Mr. Hanson has supplied an exact duplicate of this set, except that the shorter wave is 43 meters, (6973 Kc.) for the big Fokker plane of the Byrd Expedition as well.

The Byrd Expedition at this writing has just arrived at King's Bay, Spitzbergen, and unloaded its airplane. KEGK, the "Chantier", base ship of the expedition, continues to dump fine signals into the States. The receiver on the "Chantier" is one of the new Grebe short-wavers but the transmitter again is the work of Mr. Hanson, who is making quite a reputation for himself as the designer of short-wave apparatus for exploring parties. Mr. Hanson accompanied KEGK across the Atlantic, making final adjustments and tests of the equipment, and has now returned. KEGK has two 250-watters supplied with 500-cycle juice. On the 40-meter band the set uses a tuned-grid tuned-plate circuit after the fashion of KFUH, with the tubes-in parallel, but for 20 and 13 meters it uses a radio-frequency push-pull ("back-to-back") circuit with floating filaments. The main ship's antenna is used, operating at harmonics, against a variable single-wire counterpoise.

In addition to the airplane set for the Fokker which Hanson built, the expedition also has a combined transmitter and receiver donated by Robert D. Russell of

Wellesley, Mass., which will be used either on the smaller plane, a Curtiss "Oriole", or for the advanced base or for lifeboat use.

Many stations have worked KEGK, mostly on the 37.5-meter wave. Our description of the equipment is taken from a 300-word message Mr. Hanson sent to the Editor via 1AMD, Providence, as KEGK approached the shores of England.

KEGK Schedules

Now that the "Chantier" has reached Spitzbergen, regular operation is being undertaken on the shorter waves. The location of a powerful set at a respectable distance, anxious to communicate with this country, gives us short-wave amateurs an ideal opportunity to try some of the shorter waves. Several rather scrambled sets of advices have reached us from the "Chantier" but from which it seems that KEGK will now pursue daily the following schedule of short-wave operation *in addition to all previously-announced schedules*. Experimental schedule daily on 12 meters (25000 Kc.) at 1720 G.M.T. or 12:20 p.m. E.S.T. Experimental schedules daily on 20 meters (15,000 Kc.) at 2020, 2220 and 0020 G.M.T., or 3:20 p.m., 5:20 p.m. and 7:20 p.m., E.S.T. In these 12-and 20-meter schedules, KEGK will call "CQ Test" for five minutes, then listen for five minutes, so on alternating for a half hour on each schedule. From 0220 G.M.T. on (from 9:20 p.m. E.S.T., on) KEGK will be on 25.7 meters (11,670 Kc.), presumably for regular traffic work. We have received no advices, however, of the abandonment of the normal wave of 37.5 meters (8000 Kc.). News bulletins for "The New York Times" are to be broadcast daily. League members receiving such messages are requested to wire the "Times" to that effect, whereupon if the message has not already been received from other sources the paper will be glad to arrange for its transmission to them at their expense.

Meanwhile the Amundsen expedition is ready at King's Bay to receive its dirigible, the "Norge", in which it is planned to fly across the Pole and the unexplored area to Pt. Barrow, Alaska. Unfortunately the "Norge" carries no short-wave radio, as far as we have been advised. Instead she is equipped for various commercial wavelengths which we seem to remember as fitting between 600 and 1600 meters. This is too bad, as such waves probably will prove useless during the time when they may be most needed. "The New York Times" is greatly interested in this expedition and has taken out a license for a station at Pt. Barrows, chiefly in this connection. The call is KDZ and the station is licensed for 21.4, 42.08, 74.77 and 149.2 meters (14,000, 7125, 4010 and 2010 Kc.). We understand that at this writing a cor-

respondent and an operator are mushing to Barrow to operate this station, still being some two weeks out.

It looks like it's going to be a great summer for the folks on the top of the earth, and we may expect to get in on it. As usual, please report any contact or interception to Headquarters, so that we may keep the story up to date.

—K. B. W.

The Grebe CR-18

THE latest addition to the short wave family is the set manufactured by Grebe and called the CR-18. It is an addition we have been looking forward to and expecting for some time.

A glance at the photographs and the circuit will show you that the "18" is an old friend of ours; plug-in coils, throttle condenser, regeneration control, variable primary coupling, spacewound coils, low capacity grid condenser and correspondingly high grid leak resistance, a detector and a stage of audio amplification. In place of the usual R.F. choke in the primary of the amplifying transformer a 25,000 ohm "grid leak" resistance is used.

The secondary tuning condenser C has a maximum capacity of 130- μ fd. It is shunted by a vernier condenser consisting of a single plate widely separated from another single rotor plate. The maximum capacity of the vernier condenser is about

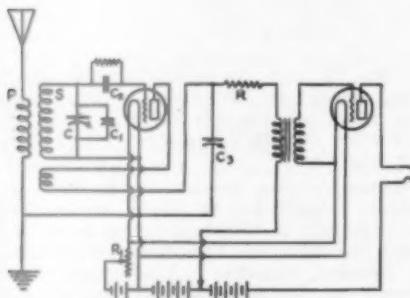


FIG. 1. THE CR-18 CIRCUIT
C—Maximum of 130 μ fd.
C1—Vernier of 3 μ fd. maximum capacity.
C2—40 μ fd.
C3—220 μ fd.
R—25,000 ohms.
R1—10 ohms.

3- μ fd. The throttle condenser as well as the tuning condenser is of straight frequency line type, the Grebe condensers being quite small with correspondingly restricted fields. The grid condenser has a capacity of 40- μ fd. and is shunted by a

7-megohm leak. The tube slides into oscillation smoothly with a barely perceptible "plop." The regeneration control is remarkably smooth and free from dead spots.

The coils are of the Hammarlund space-wound type using No. 16 S.C.C. magnet wire, space wound on a transparent dielectric. The turns are spaced ten to the inch. Secondary and tickler coils are mounted on the same plug-in block fitted with G-R plugs. The primary coupling coil has eight turns. The coil is hinged so that the coupling can be varied. With the five coils available the tuning range is from 8.5 meters (35,000 K.C.) to 216 meters (1,380 K.C.).

By means of the very small vernier condenser quite accurate tuning can be accom-

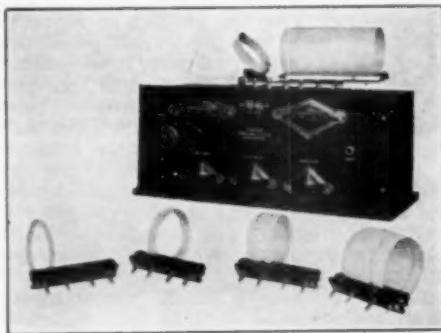


FIG. 2. THE RECEIVER WITH ALL COILS
Note that the coils are plugged in way up in the air, and that the lid of the cabinet does not have to be opened to accomplish this.

plished with the minimum amount of distortion. We wish that the tickler coil had been made much smaller and that the antenna coupling coil had been placed at the same end of the secondary as the tickler.

The receiver operates entirely satisfactorily and the workmanship is of the usual Grebe excellence.

—J. M. C.

Strays

Speaking of that low power transmitter, a nice form of plate supply with rectifiers can be obtained by using a Kenotron rectifier tube operating from a step-up transformer. The model 216 is available through the American Sales Company for \$1.85. At this price one can afford to use this tube in a B-battery eliminator, as a rectifier for low power sets and even paralleled for higher power operation. Single tubes will safely handle up to 600 volts at 50 or 60 milliamperes.

Amplifier Ins and Outs

By C. T. Burke*

IN designing an amplifier, two things are to be considered; what goes in, and what it is desired to have come out. Barring set noises, no more can get out than went in. Lots that goes in does not come out. This is frequently a blessing. We have heard amplifiers that almost completely eliminated the saxophone from an orchestra. This was distortion, but the effect was most pleasant.

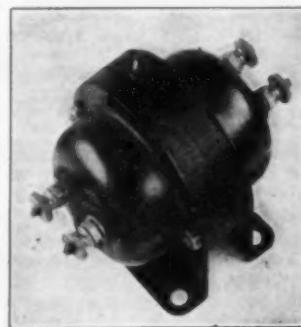
The broadcast listener, being a glutton for punishment, usually wants to hear the music just as it is produced at the studio, saxophone and all. That is, he is after "quality" (the term applies to the production, not the entertainment.) The amateur on the other hand is interested only in noise. Quality requires even production of all frequencies. In telegraph work, the received signal is at a single frequency. A transformer intended for this purpose only, should amplify only a narrow band of frequencies, so that interfering noises at other frequencies are cut out. A recent QST article dealt with this type of transformer.¹

An audio transformer may be reduced to the filter circuit of Fig. 1 which is a band pass filter. The inductances are the coil and leakage inductances. The capacities are coil capacities, tube capacities across the primary and secondary, and any condensers that may be added. By properly proportioning the constants of this circuit, a band as wide or as narrow as desired may be passed. This is not as easy as it looks,

graph work, it should be from 800 to 1200 cycles approximately.

With the transformer design established, the characteristic may be changed a good deal by external tuning. This is generally ruinous to broadcast quality, but may be helpful in telegraphic work. This is discussed at greater length in the latter portion of this article.

The problem of "quality," by which is meant the accurate and faithful reproduc-



Transformer A. The familiar General Electric "distortion transformer," designed for 500-cycle spark reception or other signals giving a 1000-cycle tone. Also known as UV-712.

tion of the matter sent into the air at the broadcasting station, is three-fold; embracing tubes, transformers, and loudspeakers. As each phase of the subject is worthy of individual consideration only the second, that of transformers, will be considered here. The other two should not be forgotten, however, for the amplifier cannot be much better than its poorest element. Perfect transformers will not compensate for improperly biased, overloaded tubes or a squawky loudspeaker.

As magazines are printed, not broadcast, it is necessary to compare transformers on paper. The means of doing this is to reproduce the "amplification curve." The data for this curve is obtained by measuring the amplification at a number of frequencies. A curve is plotted of amplification against frequency, and as the principal source of transformer distortion is unequal amplification of different frequencies, a study of this curve shows even more definitely than the ear could, just what is the relative rating of two amplifiers. It is not necessary to have the curve a straight horizontal line, which would indicate the perfect amplifier. A variation of twenty-five

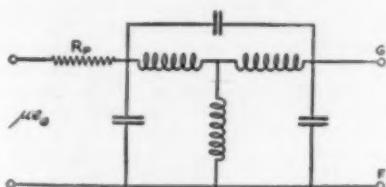


FIG. 1

FILTER CIRCUIT EQUIVALENT TO
AUDIO TRANSFORMER

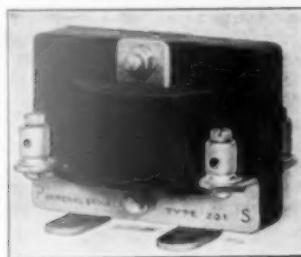
By proportioning the constants a band of desired width may be passed.

however, as the constants are not generally independently variable, and changing one in the direction you want to go usually sends all the others the opposite way. For broadcast work the band should extend roughly from 100 to 5000 cycles. For tele-

* Engineer, General Radio Company, Cambridge, Mass.

1. Page 29, April, 1926.

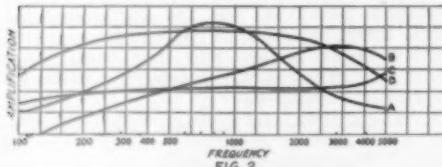
percent would not be perceptible to the average ear. The frequencies above five thousand may be lost without serious loss of quality. The curve should remain high for frequencies at least as low as one hun-



Transformer B. General Radio Type 231. The transformer used to obtain the "B" curves was actually of another make but had properties similar to the one shown.

dred cycles. Probably the most interesting part of the curve is that between one hundred and five hundred cycles. Most of the older transformers failed to amplify in this range, and its full amplification is essential to natural sounding music. In order to study this part of the curve, which is crowded at the lower end, a special method of plotting the curves has been resorted to. Instead of making the distance along the frequency scale proportional to frequency, it has been made proportional to the logarithm of the frequency. The effect is similar to that obtained with the "straight line frequency" condensers now so popular. The lower end of the curve is opened up, spread over more space.

Just how much transformers have improved during the last few years is apparent from the curves of Figure 2, which



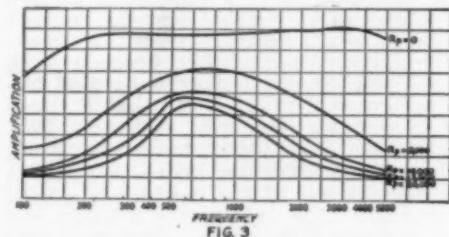
CURVES OF REPRESENTATIVE TRANSFORMERS UNDER NORMAL CONDITIONS

A and B are older types. A being deliberately designed to produce an 800 cycle peak. Peaks similar to those of A and B are sometimes produced unintentionally by an inferior design.

show the characteristics of four transformers of different vintages. Transformers A and B are of the older type, designed before the period of development of quality reproduction. No's. C and D are both "new

era" transformers. The difference between the new and the old is very noticeable. A has a marked peak at about eight hundred cycles. This frequency would be amplified to a much greater extent than those above and below, resulting in bad distortion.² B lets through practically nothing under one hundred cycles and has but half its maximum amplification at four hundred cycles. Many frequencies go into this amplifier do not come out. The result of this type of distortion, the loss of the low frequencies, is to give music a harsh mechanical sound. The transformers of curves C and D are a vast improvement over these earlier types, and are typical of several transformers making their appearance during the past year. The deviation of the maximum and minimum from the average amplification over this range is so slight as to be barely noticeable to the ordinary ear.

An interesting and important fact is discovered when the turns ratio of these four



THE EFFECT OF VARYING THE PLATE IMPEDANCE OF THE PLATE WORKING INTO TRANSFORMER A, WHICH HAS A LOW PRIMARY IMPEDANCE
FIG. 3

When the plate impedance equals that of the ordinary receiving tube (12,000 to 15,000 ohms) the curve is very peaked.

transformers is considered. A had 8.5:1, B 3:1, C 2:1, D 6:1. Note that the 8.5:1 transformer has a lower amplification than the 6:1 over practically the entire frequency range, and at both ends passes below even the 2:1. Another interesting point is that the 3:1 transformer distorts to a much greater extent than the 6:1, despite the popular idea that low ratio transformers necessarily have better characteristics than those of high ratio.

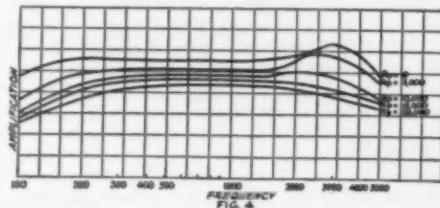
It was not entirely without reason that high ratio transformers have been viewed with some suspicion. Notice again the curve of the 8:1 transformer. This is typical of the older style high ratio transformers. The loss of the high frequencies is easy to understand. The coil capacity acts as a by-pass for these frequencies, short-circuiting them to the ground. The loss of the low notes is due to the fact that the

2. Or else in good distortion—depending on the viewpoint. This transformer was originally produced for reception from 500-cycle spark sets. Such sets produce a 1000-cycle tone, practically in the peak of the transformer.—Tech. Ed.

primary turns were kept low in order to get a high turns ratio with a small coil. The result of this practice may be explained with the assistance of the curves of Figs. 3 and 4.

In the audio amplifier, the transformer primary is connected in series with the plate impedance of the tube, which is about 15,000 ohms for the common types of receiving tubes. A considerable portion of the voltage supplied by the signal is used up in this impedance. The portion of the voltage left across the transformer primary depends upon the relation of transformer impedance to the total impedance of transformer and tube. Thus if the tube impedance is 15,000 ohms and the transformer impedance 30,000, two-thirds of the voltage will be impressed across the transformer primary. It will now be seen why a high ratio transformer sometimes gives less amplification than one of low ratio. Suppose a 5:1 transformer had 150,000 ohms impedance at a certain frequency. Another transformer with an 8:1 ratio has but 15,000 ohms impedance in the primary. Both are used with a 15,000-ohm tube, with 10 volts available. The 5:1 transformer will have 150,000/165,000 of 10 volts or 9.3 volts across the primary. Assuming no losses the secondary voltage would be 47 volts. Only 15,000/30,000 or 5 volts will be

former varies over the frequency range. This, of course results in distortion (unequal output of different frequencies). Distortion due to this cause can be reduced by means of a high primary impedance. The input to the transformer cannot be greater at any frequency than the tube voltage. If at the lowest frequency it is intended to amplify, the transformer impedance is three times the tube impedance, the input will not



THE EFFECT OF PLATE IMPEDANCE ON THE OPERATION OF TRANSFORMER D WHICH HAS HIGH PRIMARY IMPEDANCE

The curves of Fig. 3 and 5 show the importance of making measurements with a resistance in series with the transformer primary. Otherwise an entirely false impression may be conveyed.

less at any frequency than 75% the tube voltage, that is, not more than 25% difference in amplification of different frequencies can occur. On the other hand, if the transformer has but half the tube impedance at this frequency, the difference will be 65%.

The curves of Figure 3 were taken on transformer A, using different values of plate resistance. If the plate resistance could be reduced to zero, even this transformer would give little distortion. The curve becomes more and more peaked as the value of R_p is increased, and the amplification per stage is greatly lessened. In Figure 4 is shown a similar group of curves for transformer D. This is a transformer of high primary impedance, 155,000 ohms at 1,000 cycles as compared to 15,000 for A. It will be seen that while the curve is better for the lower plate resistances the difference is much less marked than in the case of A. The advantage of a tube of low impedance is obvious. That is one of the advantages of the new R.C.A. tubes.

We have shown the essential requirement of equal amplification of all frequencies to be a high and nearly equal impedance of all frequencies. This is accomplished by the use of many turns of wire, with a large core of high permeability steel, and by proper coil design, avoiding capacity that acts as a by-pass for high frequency. This requirement may be met in a transformer of high ratio as well as one of low.

So far we have been dealing with the problem of the manufacturers. They have met it with surprising success, as several of the new transformers show. It is up to the builder to make the best use of the



Transformers C. and D.—Modern "flat curve" transformer used in making the C and D curves. C is general Radio Type 285L, having a turn ratio of 2:1 which D is type 285, having a turn ratio of 6:1.

impressed across the primary of the 8:1 transformer, with a secondary voltage of 40.

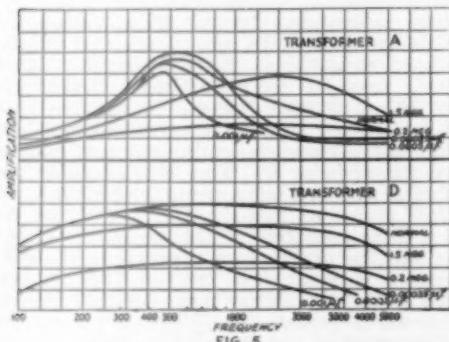
As the transformer impedance varies with frequency, while the tube impedance remains constant, the input to the trans-

manufacturers' efforts and not spoil the result by touches of his own.

Many radio builders think it an advantage to shunt their transformers with condensers or grid leaks. While this practice sometimes helps to improve quality with the old type transformers, with a transformer of good design it generally ruins quality.

A condenser across the primary of the first audio transformer is usually advisable, and may be as large as .005 microfarads without affecting the faithfulness of reproduction. Devices across the secondary are particularly harmful. Fig. 5 shows the effect of several sizes of condensers and grid leaks across the secondary. The effect of the condensers on transformer A (shown in the upper half of the figure) is to make still more marked the peak in the central portion of the curve. The high frequencies are cut off with increasing effectiveness as the sizes of the condensers are increased. It is interesting to note that at some frequencies resonance effects carry the curves with shunting condensers above the normal curve. The use of grid leaks improves the quality with this poor transformer. With a leak of 1.5 megohms, a curve similar to B of Fig. 2 is obtained. This curve is poor but somewhat better than the normal one. When the shunting resistance is reduced to 200,000 ohms a very flat curve is obtained, but the 8:1 transformer gives less amplification than a 2:1.

The effect of shunting condensers across



A GROUP OF CURVES SHOWING THE EFFECT OF SHUNTING VARIOUS DEVICES ACROSS THE TRANSFORMER SECONDARY

The upper group was taken with transformer A, the lower on transformer D. Note that the distortion transformer can be made to give a flatter curve with lesser amplification but that the same devices applied to the transformer D caused the curve to become both lower and more peaked.

the secondary of transformer D is similar to that observed in A. The amplification of high frequencies is greatly reduced, with

3. This is helpful when the transformer is used in radio telegraphy. The .00025 condenser produces a noticeable improvement for this service. C. T. B.

the point at which the curve falls coming farther toward the low frequencies as the condenser size is increased. The improvement in quality gained by shunting the secondary with a resistance is not so marked as with the badly peaked transformer. A great loss of volume is caused by this practice. With the 200,000-ohm resistance across the secondary the amplification is cut approximately in half, with no great improvement in quality.

The radio set can be made to reproduce music as faithfully as the average phonograph, or even more so. If this is to be accomplished the whole amplifying and reproducing system must be laid out with this purpose in view. Good transformers must be used, in the way the manufacturers intended them to be used. Tubes must be properly biased, and not overloaded, and finally, all other precautions are in vain unless a good reproducer is used.

Central Division, 3rd Annual Indiana State Convention, July, 30-31, 1926

AT South Bend, Indiana, under the auspices of Old Timers Radio Club, this will be held. Take notice ye Hams of Indiana and neighboring States ye are cordially invited to attend this third A.R.R.L. Conclave to be holden in Ye Hotel LaSalle. Special hotel rates of \$1.50 to \$2.50 have been offered by ye management.

Ye Committee desires to say it is planning a real hamfest full of A.R.R.L. spirit as it was and is. Sight-seeing tours, swim at nearby lake including a "feed" and good meetings are all a part of the program.

Send in your reservation to A. R. Kahn, 9-CCL, Convention Secretary, 1069 Riverside Drive, South Bend, Indiana.



A Multi-Stage Crystal-Controlled Transmitter

By John M. Wells* and E. D. Tillyer**

The authors explain the construction and adjustment of a crystal controlled transmitter in which a thick crystal is used to control a low-power tube. Amplification is carried on through two low power stages operating on harmonics of the crystal oscillator. Such a transmitter gets around a lot of difficulties which may be experienced when using a relatively thin crystal, and amplifier stages operating at the crystal frequency.—Asst. Tech. Ed.

MUCH has been said and written lately on the subject of crystal controlled transmitters. It might not be amiss, however, to review briefly the distinct advantages of this form of transmission before going into details of the transmitter herein described.

In the first place when using crystal con-

ceiver stays the same pitch, assuming of course, that the receiver stays constant. This means that the signals will be much more readable than is usually the case with the present day short-wave amateur transmitter.

In the second place, the use of crystal control is very helpful in obtaining a splendid note.¹ It is common for an amateur to find that, on short waves, his note becomes very rough and hard to read in spite of the fact that a direct current generator is being used, or a source of well rectified and filtered A. C. is on hand. Such has been the case at 1CAK. Using filtered motor generators the note has been reported as being anything from "fair A. C." to "raw A. C." at the receiving end. With the advent of crystal control the note has always been reported as "pure D. C." In fact many amateurs have asked if storage battery plate supply was being used. Since crystal control has been used at this station there has been no change in the previous plate supply.

The answer to this phenomenon is probably found in the fact that the cause of most poor notes on short waves is not necessarily

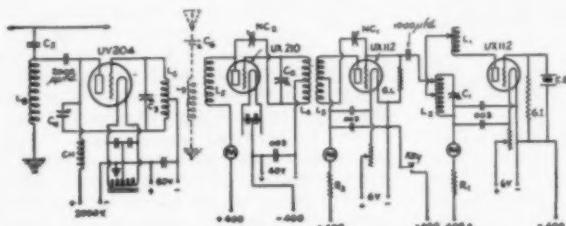


FIG. 1. THE THREE-STAGE POWER-AMPLIFIER CRYSTAL-CONTROLLED CIRCUIT

- R1, R2 12,000 ohm Lavite units.
- C.O. Piezo-electric crystal. About 320 meters for operation in 80-meter band; 160 meters for 40-meter operation. Using 2nd harmonics throughout.
- L1 200 turns No. 24 D.C.C. wire on form $2\frac{1}{4}$ inches in diameter. Coil tapped at 5 places.
- L2 13 turns No. 18 bare wire on form 3 inches in diameter, spaced 12 turns per inch, and tapped in the center and also 3 turns from one end.
- L3 8 turns No. 26 D.S.C. wire wound over exact center of L4, Empire cloth insulation between. A tap is taken off at the center.
- L4 8 turns No. 18 bare wire on 3 inch form, spaced 12 turns per inch with a tap at center.
- L5 3 turns No. 26 D.S.C. wire wound over exact center of L6, Empire insulation, and tapped in center.
- L6 7 turns No. 16 bare wire 3 inch form, spaced 6 turns to the inch and tapped in center.
- L8, L9 Antenna inductance for antenna you use.
- C1 G-R 500- μ fd.
- C2 ditto 250- μ fd.
- C3 Cardwell 450- μ fd. transmitting condenser.
- C5 Small antenna coupling condenser for Hertzian antenna.
- C6 Antenna series condenser, maximum of 100- μ fd.
- NC1 Small neutralizing condenser.
- NC2 Pyrex tube and brass rod condenser. Must stand oscillating voltage.
- C4 Neutralizing condenser, maximum capacity around 70- μ fd. Use a G-R midget vernier immersed in automobile oil.
- CH Radio frequency choke for parallel feed.
- GI Varies with crystal. Usually around $\frac{1}{4}$ megohm.
- GL About 1 megohm.

trol, the emitted frequency remains absolutely constant when the circuit is properly set up, irrespective of any changes in the antenna or tube circuits. The note in the re-

¹ Any one who has heard NKF, 4BY, 2WC, 1AXA, 4FM, 4BK, 4XE as well as 1CAK will testify to the beauty of the crystal controlled note.—Asst. Tech. Ed.

* 1CAK, 1ZD, 1XAX of Southbridge, Mass.

** Research Laboratory, American Optical Company, Southbridge, Mass.

in the poor plate supply but is due to *changes in frequency* in the transmitter. These changes take place for a number of reasons. Vibration of the building and the apparatus plays an important part. Any changes in the plate voltage tend to create variations in frequency. Probably irregular heating of the tube filaments by alternating current supply has an effect upon the constancy of the frequency. The use of crystal control

Another trouble experienced by a great many transmitter builders is that it is difficult to control a large tube with a small master oscillator. In the case of a crystal-controlled transmitter this can be done if the circuits are designed and set up with care. As will be shown later the transmitter used here is controlled by a 7½-watt oscillator which feeds a 250-watt power-amplifier with normal plate voltage but somewhat increased plate current in the oscillator tube.

Due to the fact that each power-amplifier tube (except the last one) is tuned to a harmonic of the preceding tube self-oscillation troubles are eliminated to a large extent. This makes the set unusually stable for a power-amplifier type of transmitter.

Contrary to expectations it was found to be quite simple to shift from one waveband to another, it merely being necessary

to change the crystal and retune the circuits with the condensers. If content with slightly reduced output on 40 meters, the 320-meter crystal can be left in place and the shift from one band to another becomes even simpler. The only real difficulty in tuning is in the original set-up and proper adjustment of inductance and neutralizing condensers, which remain fixed (except in the last stage) when once properly tuned.

The Various Circuits

In order to set up a transmitter of this type there is only one way to proceed in order to get quick results. Take each tube circuit separately before starting to build the next one. Make the crystal oscillator work before you build any of the amplifiers,



FIG. 2. CRYSTAL TUBE AT LEFT, 1st POWER AMPLIFIER STAGE IN CENTER AND SECOND AMPLIFIER AT RIGHT

obviates these effects. With crystal control and a moderately good source of plate supply, the note will be pure.

There are several difficulties encountered when one constructs a crystal controlled transmitter. Some of these have been eliminated in the present set. First of all it is difficult to obtain satisfactory crystals for transmission purposes. They are expensive to buy and if one attempts to cut and grind them the work is difficult and the certainty of good crystals is not sure.² When one comes to crystals which oscillate in the 40-and 80-meter bands the problem becomes worse. Also at these frequencies the trouble of breakage becomes important. The trouble with thin crystals can be eliminated by the use of relatively thick ones even though the set is operated in the 80-40-and even 20-meter bands. For 40-and 20-meter work crystals oscillating around 160 meters are used, and for 80-meter transmission crystals having a wavelength near 320 meters are employed. As a matter of fact crystals oscillating around 320 meters or 240 meters can be used to work in the 40-meter band with slightly reduced outputs. Using a 320-meter crystal the writer has put 300 watts into a 250-watt tube on 40 meters.

² In addition it is understood that quartz as found in the U. S. is not suitable for piezo-electric crystals. Most of the crystals we know of have been extracted from quartz coming from Brazil or Madagascar. The U. S. quartz is usually too full of flaws, cracks, bubbles, phantoms and twins.—Asst. Tech. Ed.



FIG. 3. FRONT VIEW OF SET SHOWN IN FIG. 2. NOTE THAT ALL IMPORTANT CIRCUITS HAVE METERS

and after the C. O. is working add a stage of amplification; after this is working put on another stage and so on. The photographs, diagrams and diagram explanations should be sufficient to give the constructional details. The complete circuit is shown in Fig. 1. The crystal oscillator is a UX-112 with 400-volt generator supplying plate voltage through a 12,000 ohm resistance. The second tube is also a UX-112

with the same plate voltage. The third tube uses a UX-210 with 400 volts direct to the plate. These three tubes are shown in Fig. 2. These three tubes in the circuit shown make a very excellent low-power crystal-controlled transmitter—one that anyone can afford to build. The unit comprising the circuit this far described should be the start of almost any kind of crystal-controlled transmitter. Any additional stages of amplification one desires can be added to this original unit. As a low power set this unit makes an excellent 'breaking into crystal transmission' layout. A 50-watt can be added later on, and can be substituted for the 204 power amplifier to be described later on. The antenna is coupled to the inductance L5, as shown in the dotted lines.

Going back to the circuit, the inductance L1 may have to be tuned with a variable shunt condenser in some cases. The grid leak may have to be varied, also, with some crystals. The crystal holder consists of two parallel brass plates between which the crystal is placed. About one quarter of a millimeter spacing is left between the crystal and the top plate. The original crystal holder was mounted to hang from a hook, suspended by rubber bands, but later this was found to be unnecessary.

The inductance L2 is tuned by condenser C1 to a harmonic of the crystal. When working in the 80-meter band, using a 320-meter crystal, this coil is tuned to 160 meters. For 40-meter transmission, with a 160-meter crystal, this coil is tuned to 80 meters. It can also be tuned to 80 meters when using a 240-meter crystal for 40-meter transmission. If a 320-meter crystal is used for 40-meter transmission we have found in practice that it is *much better* to use the following set-up: oscillator tube tuned to 320 meters, first amplifier tuned to 160 meters, second amplifier tuned to 80 meters and the final stage to 40 meters. As a crystal oscillator tube it was found that the UX-112 provided greater stability than 201-A when using full power.

The first amplifier also employs a UX-112 tube. For best results it has been found necessary to neutralize this tube in spite of the fact that only harmonics are being used. The grid leak value is not critical. Keying is done in the negative lead of the first amplifier. The fact that there is a high resistance in series with the plate of this tube makes keying relatively easy, and also helps to eliminate key clicks.

The second amplifier tube is a UX-210. The same 400-volt generator is used here with full voltage on the tube. The neutralizing condenser is a Pyrex tube with a brass rod inside and a copper sleeve outside. The condenser must stand considerable electrical strain. The inductance L4 is tuned by condenser C2 to some harmonic (usually the 2nd) of the preceding tube.

When using the 250-watt power amplifier in the last stage the power from the UX-210 is fed to the big tube by means of induct-

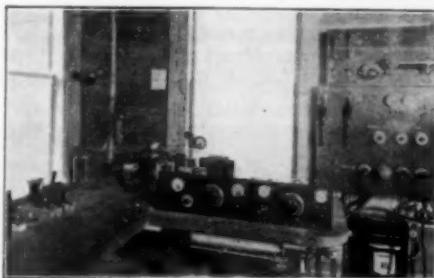


FIG. 4. COMPLETE TRANSMITTER AT 1CAK. THE 204 POWER AMPLIFIER STAGE IS IN THE REAR OF THE CRYSTAL-OSCILLATOR POWER-AMPLIFIER PANEL

ance L5. The antenna may be coupled to L5 through C6 and L9 for operation directly from the UX-210 stage. The last stage is the most difficult to put into operation. Great care must be used in the proper placing of the coils and the neutralizing condenser adjustment is also very important.* This condenser is subjected to *very great* strains. The one used here consists of a General Radio midget vernier condenser immersed in a sponge glass full of automobile engine oil. If content with outputs of about 125 watts, the 250-watt amplifier stage can be tuned to a harmonic of the UX-210 by means of condenser C3 and inductance L6. If this is done the adjustments are much less critical. For full power, however, the last stage *must* be tuned to the wavelength of the 210 tube. With care power inputs to the 250-watter have been as high as 600 watts.

It might be interesting to outline the adjustment of a transmitter of this type for 40-meter operation when using a 160-meter crystal.* First make sure that the crystal tube is oscillating vigorously. This will be indicated by a sharp drop in plate current of this tube. Adjust L1 and the grid leak so that this drop will be as large as possible. Next tune the first amplifier to approximately 80 meters by means of condenser C1. Vary this condenser gradually until the plate current in this tube drops to a *minimum* with the condenser set to tune the coil to exactly half the wavelength of the crystal tube. This is with grid leak control of the grid bias.

Now tune the UX-210 circuit to approximately 40 meters by varying condenser C2. This condenser is also varied until the plate current in this tube is at a *maximum* with

* We desire to point out again that complete shielding (when not operating on harmonics) is *very* desirable. More complete neutralization can be had, and the adjustments are much easier to make.—Asst. Tech. Ed.

* See also QST for May, page 43.—Asst. Tech. Ed.

the condenser set to tune this circuit to 40 meters, or the 4th harmonic of the crystal. The grid bias in this stage is obtained from a C-battery.

Tune the 204 circuit in the same manner as the UX-210 was tuned. In this case, however, the antenna circuit should also be tuned at the same time as its tuning has some



FIG. 5. A CORNER OF THE OPERATING ROOM AT ICAK. TRANSMITTER NOT SHOWN BUT IS AT EXTREME RIGHT ON TABLE

effect on the tuning of C3. After all of these adjustments have been made, return each of the circuits by means of C1, C2, C3 and C5, beginning with C1, to get maximum antenna current.

It must be understood that before any of the preceding tuning can be done, the neutralizing condensers must be adjusted and the correct location of the taps on coil L2 must be found. Once set, these controls do not have to be changed, with the possible exception of the neutralizing condenser C4 which is very critical.

This set is still in the experimental stage. It has not been operated very many times. During the few hours it has been on the air, however, very enthusiastic comments have been received from all amateurs worked. Two French stations have been worked on 40 meters. Their reports were "R7-R8, pure D. C. very steady". b22AB has been worked and GVC was communicated with when he was 1,500 miles north of Ottawa. Numerous U. S. and Canadian amateurs have been worked also.

The time spent in building and adjusting a crystal controlled transmitter of this type will repay itself many many times over for there is a great satisfaction in knowing what your note will be like at the receiving end, and in knowing that if the signal is strong enough to copy at all, the receiving operator will have no trouble in reading you.

The UX-874 Regulator Tube

We present herewith photograph of the UX-874 regulator tube which was described in detail in the "new tubes" story appearing on page 33 of our May issue. The photographs were not available at that time.

As can be seen the tube contains a reinforced tubular plate supported from the glass stem by several wires.



Attached to the lower rim of this plate is a sort of tiny frying pan which contains the chemical "getter" used to complete the exhaust, or perhaps some material which generates gas of a kind and amount suited to the requisite glow action of tube. In the samples that have been examined this frying pan has its lid firmly fastened except at the lower edge which is open somewhat so that gases could escape into the tube. At any rate phosphorus is seemingly used for a "getter" since a momentary phosphorus fire of tiny proportions occurred on the stem next the little pan when the glass of the tube was broken away. This accounts for the missing corner of the stem, which the little pinpoint of flame managed to crack off. Don't be alarmed, though—the fireworks were almost too small to be seen and probably would not happen in most tubes—besides which one isn't in the habit of breaking tubes into a powder keg.

Looking at the top view of the tube we can see the central stem inside of which is the other electrode—a wire of small diameter. This wire is surrounded by an insulating sleeve of some such material as lavite but projects a quarter inch or more. Almost touching this projection is a wire from the plate, leaving only a small gap across which the glow discharge starts—shifting immediately to the plate and with increasing loads covering larger areas of the plate as described in the writeup previously referred to.

—R. S. K.

Strays

3LD fell from the top of his 80 foot mast without even scratching himself. He says he was wearing his light fall coat.



Experimenters' Section Report

ENROLLMENTS in this Section have been coming in steadily at a rate that has changed very little since the re-enrollment was begun. Our estimates as to the outlines which would be in greatest demand were wrong but all have been taken care of now—the first time in the history of the Section.

Outline Changes

The outlines that have been sent are meant to be changed. The only reason for the existence of the Experimenters' Section is to exchange ideas between the members. If no ideas come in there will be none to exchange—we do not generate much experimental information at 1711 Park street, since we have neither the time nor the equipment. Therefore, by all means, begin at once to give us your ideas as to useful changes in the "outlines." It will also be very useful to tell us what you are doing or planning to do on your particular subjects. Only if we are kept constantly in touch with your work can we be of the most use to this section.

Correspondence

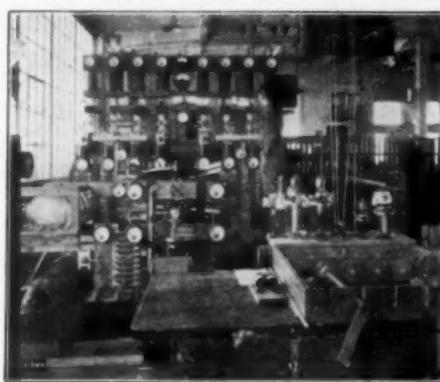
One of the main reasons for the existence of a "Section" is to provide contact between the men enrolled in the same problem. For this reason we have issued lists of the members, classified by problems. In the past these lists were great 14-page affairs that included all men and all problems. This has been dropped in favor of a separate list for each problem, so as to make more frequent revision possible. By all means get into correspondence with the other men on your problem. If the list has not reached you, ask for it.

Laboratory Tests

The outlines that have been sent have tried to avoid suggesting laboratory methods in much detail, since we feel that it will be better to let each man devise his own methods and apparatus. Naturally we are willing to pass on any additional information that we may have or can get. It will also be helpful to write to the other men on the same problem—but most of all it will help to keep the Section *constantly* advised of anything that you may have found out. It is not necessary to wait until the job is altogether done and a finished engineering report made. Frequently it is a needless piece of labor to do that. Almost always the result will be to let the information die of old age.

Radio Surveys—Problem G-12

The weather—the barometer—the moon—the sun—any number of things are likely to have an effect on radio transmission. To study them takes time and patience, system and organization. Recording the received signals is only a very small part of the whole job. For that reason the men enrolled in this problem will be put in touch



2XAG—THE HIGH-POWER WGY.

The wooden "grind organ" at the front right controls the tuning, couplings etc. The main thing to be noted here is the mere size of the set and the fact that it is almost completely insulated with treated maple wood.

with such organized tests as the "April Tests" of the General Electric Company. In general we will take part in someone else's tests because A.R.R.L. Headquarters is not equipped to handle the big job of analyzing thousands of records of reception.

Several other tests are now being planned by the General Electric and others. The "G-12" men will be notified as soon as possible.

South Schenectady and the April Tests

THROUGH the courtesy of Mr. W. T. Meenam of the Publicity Department of the General Electric Co. there follows a description of the radio test plant from which the April tests were sent for the A.R.R.L. observers. A portion of this material is from publicity releases, a portion from interviews with Mr. Meenam and the operating staff at South Schenectady, while that part relating to the 32-meter station was written for QST by one of the men at that building.

The Plant as a Whole

Reference to page 41 of our April issue will show that tests were sent at the same time at 15, 26.4, 32.79, 51.9 and 65.16 meters wavelength with powers from .6 to 10 kilowatt. If one happens to prefer larger numbers this corresponds to 20,000; 11,370; 9,150; 5775 and 4600 kilocycles. To carry on these transmissions at the same time calls for quite a radio plant, but South Schenectady not only did that, but in addition carried on high-power broadcasting at 380 and 1560 meters wavelength. By this time one begins to get some idea of the size and complexity of the test plant which occupies a 54-acre plot about 2 miles southwest of Schenectady at a place that seems to be called indifferently "South Schenectady" or "Mariaville."

On the plot is a main building 60 x 100 feet and a variety of small frame buildings housing various transmitters. The main building contains the power equipment, in-



BY WAY OF CONTRAST

This is the crystal-controlled 7.5 watt master-oscillator which actuates and stabilizes the big 50-kilowatt 2XAG set. The operator holds the crystal and mounting. Just to his left (the reader's right) is the 50-watt stage following the master stage. Both normally work inside the copper-lined boxes, the panels of the two stages being of brass and connected to the box lining.

cluding the plate supply rectifiers and filters, also the big modulator which supplies modulated plate power to stations in the smaller buildings, so that these stations do not need either a modulator or an amplifier when telephony is to be used—the same

matter can be sent on all wavelengths at once. At the same time it is possible to put



THE TUNING BOX AT THE LOWER END OF THE 2XAF ANTENNA

Note the two-wire R. F. line feeding this tuning box. The antenna goes upward from the box as shown in the diagram of Fig. 1.

the modulator out of commission and to send C.W. from the various transmitters. A few of the short-wave sets also have separate plate supply so that they can send CW, while most of the stations are being modulated. When telephony is being used it is usually sent down via an underground line which begins at the WGY studio on the G.E. grounds, or at some of the usual outside pickup points.

Plate and Filament Supply

There are three rectifiers, each being able to supply 150 K.W. at 15,000 volts. In addition there are generators operating at 2,500, 4,000 and 12,000 volts for the plate circuits of the various smaller tubes as well as the modulating tubes. Filament current is generated at 33 volts by a 300-ampere and a 1000-ampere generator, each constructed so as to reduce the commutator and slot ripples.

The "Superpower WGY"—2XAG

In the main building is the 50-kilowatt 379.5 meter (790.05 K.C.) transmitter which on certain days each week takes the place of the lower-powered (though still large) station WGY which is at the Schenectady plant. This set is shown in one of the photographs. The antenna slants to the top of one of the 300-foot towers.

The 1560-Meter Set—2XAH

2XAH resembles the Superpower WGY in all ways except that the output is 40 K.W., that the R.F. amplifiers are of the push-pull type and that the antenna is a larger affair. This antenna is unusual and must be described, as it cannot be seen in the general photograph. It looks like a single turn loop 300 feet high, hung be-

tween two of the big towers. (See Fig. 2). Actually the downleads of the "loop" terminate in tuning houses and things are so adjusted that the two downleads operate in phase—i. e., the antenna is of the 2-downlead multiple-tuned variety. The power is fed into the system by means of a 2-wire R.F. transmission line which runs from the main building to one of the tuning houses, a distance of several hundred feet.

The 109-65.5-Meter Station — 2XK

With 2XK we arrive at the stations that were concerned in our tests. The antenna of 2XK is a peculiar triple-T affair which can be understood from the photograph if the ropes and wires do not look too nearly alike when the cut is printed. A counterpoise is used here for the first time—the longer-wave stations working against ground. The general nature of the set at 2XK is very much like that of 2XAF, hence no details are given. At this point it is well to say that 2XK and all stations from this point on are licensed to work at a

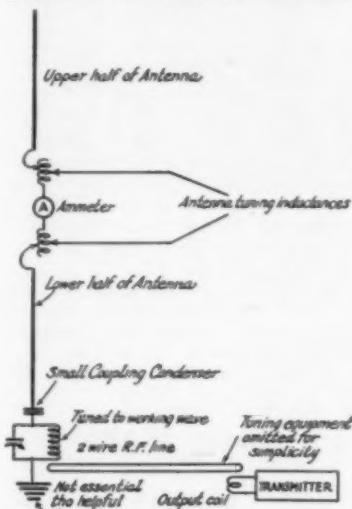


FIG 1
THE ANTENNA SYSTEM AT 2XAF

To shift the wavelength it is necessary to re-adjust both the helices at the center of the antenna, retune the circuit at the base and finally retune the set in the station. Needless to say 2XAF does not QSY at request. The system can be modified to permit easy tuning from the station. Such a scheme will be described in QST.

variety of wavelengths: They shift waves frequently, also changing antennas, power and circuits. For that reason the description given here fits the April tests—but is quite likely wrong at this moment.

2XAC — The 50-Meter Station

Unlike most of the other stations, 2XAC was on a wavelength of 51.9 meters (5775 K.C.) and was operated self-oscillating in-

stead of crystal-controlled, partly because this wavelength was not to be used a great deal, partly because the time before the tests



"WATCH CASE" CONDENSER USED IN THE 2XAH INSTALLATION

The name is not a joke but refers to the way in which the metal discs are sprung into their rims—just as a watch-crystal snaps into the watch case. In the great condenser just back of the operator six treated maple upright rods hold the metal discs, odd ones being held by rods 1, 3 and 5, even ones by rods 2, 4 and 6. This type of condenser is used in almost all the tuned circuits at South Schenectady.

was short. Little is to be said that was not stated in the April schedule—the wavelength was approximately the same and since the plate supply was independent this station sent CW, using the hand key. The wavelength was shifted slightly during the test.

2XAF — The 32.79-Meter Station

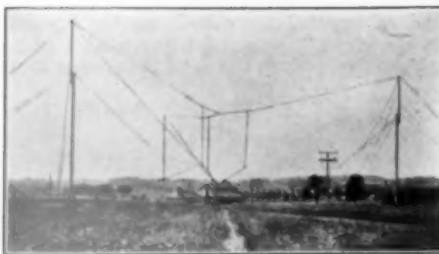
Concerning 2XAF little will be said here—the complete description comes a bit later. This station has operated at various wavelengths was the same and approximately lengths in the 30-40 meter region, or if one prefers, in the 7500-10000 K.C. region.

2XAD — 26.4 Meters

Of 2XAD not a great deal is known at this writing. This wavelength did not come down to Hartford during the tests (as far as the writer knows) and that leaves little to say except that in general this station resembles 2XAF, though the power is considerably lower.

2XAW — 15 Meters

It was an open question whether we should pay the most attention to 2XAW or



THE TRIPLE-T ANTENNA AT 2XK

Ropes from the three 89-foot masts are stretched toward a central point, the last 40 feet or so of each rope being replaced by a wire. These three wires meet at the center and are connected. From the center of each wire a downlead is dropped and these join a short way above the station roof.



TWO VIEWS OF THE 109-65.5 METER TRANSMITTER, 2XK.

From left to right we have the crystal controlled master oscillator, then several stages of screened R. F. stages (some of which are push-pull), then the big final stages which operate at high voltage and are therefore surrounded by a fence to prevent accidents. Note the characteristic "watch case" condensers in the large stages, also the neatness secured by dropping all filament and plate supply leads into the wiring gutter below the floor level.

2XAF in this story. Finally the decision was made in favor of 2XAF because it operates near an amateur band, and because it is crystal-controlled. 2XAW is self-excited, using one of the familiar push-pull oscillators and feeding a vertical antenna which is hung from a rope stretched from one of the 300 foot towers. This antenna

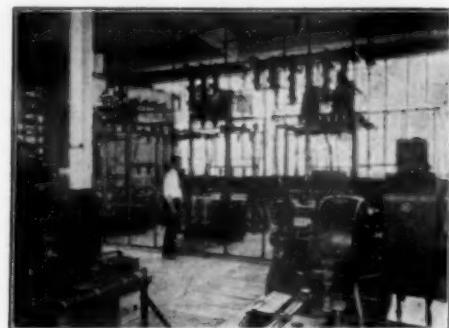


PLATE-SUPPLY RECTIFIERS OPERATING AT 15,000 VOLTS

In each of the three units the filter chokes and transformers stand on the floor, the filter condensers stand on the top of the frame. The kenotrons are at the front of the frames in two sets of three for each frame. The lower trio is at the level of the man's hands, the upper trio a bit above his head. They are rather hard to make out in the picture. At the right front is one of the filament supply machines.

seems to be operating in the same fashion as the one at 2XAF with the difference that the antenna is large enough so that it works at a harmonic.

Having run through the series of stations we can now return to 2XAF, the station that most nearly meets the conditions of amateur transmission. It will be described by one of the men associated with the station.—R. S. K.

Station 2XAF

By K. B. Austin *

THE original transmitter at 2XAF was put into operation early in the summer of 1925. It was one of the master oscillator-power amplifier type operating on a wavelength of 40.5 meters and with a power output of approximately one kilowatt. During August, 1925, the transmitter was modified by adding a crystal oscillator and amplifier chain but still retained the same output as before. The wavelength, 41.9 meters, was obtained by taking the fifth harmonic of a 1432 K. C. crystal and amplifying that harmonic through a chain of neutralized push-pull amplifiers until the desired output was obtained. In February, 1926, the power output was increased to between 10 and 20 kilowatts by the addi-

* Radio Department, General Electric Co., Schenectady, N. Y.

tion of a neutralized push-pull amplifier using two UV-207 (20-Kilowatt) water-cooled tubes. Recently the wave was changed to 32.79 meters using a system



TUNING EQUIPMENT OF THE 32.79 METER 2XAF ANTENNA LOWERED FOR ADJUSTMENT

The helix frames and the central insulator of the meter-frame are of "mycalex," a material recently put into extensive use at South Schenectady for H. F. insulation where ordinary materials fail.

of obtaining the desired harmonic from a crystal that would be very suitable for amateur use. Following is a description of the transmitter.

The crystal oscillator tube is an SA-14 or high mu UX-210. The tank circuit¹ of this tube is tuned to the fundamental of the crystal or 2287.5 K. C. The next tube is also an SA-14 and is capacity-coupled to the tank of the crystal oscillator. The tank of the second tube is tuned the second harmonic or double the crystal frequency. The second harmonic is accentuated by using a higher bias than normal on the grid of the tube in which the harmonic is taken. The third tube in the crystal control amplifier is a UV-211². It is also capacity coupled to the preceding tank and its tank is tuned

1. Meaning the tuned circuit connected to the plate of the tube.—Tech. Editor.

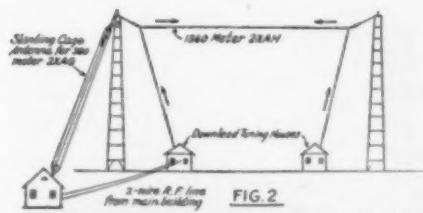
2. The previous tubes in the series are "7-1/2 watt" tubes. This one is a "low mu" 50-watt tube very similar to the 203A. The next pair of tubes is of the 1/2 K. W. size while the last pair (UV-207) is of 20 K. W. output rating.

to the second harmonic of the preceding stage or the fourth harmonic of the crystal oscillator. The output of this tube is the desired frequency, 9150 K. C. or 32.79 meters and is great enough to swing the grids of UV-204-A's which are connected in push-pull and neutralized. These in turn excite two watercooled UV-207's which are also



THE SOUTH SCHENECTADY EXPERIMENTAL RADIO STATIONS

Ignoring the small tower in the background, the two 300-foot towers farthest from the reader support the 1560-meter antenna and tuning houses for which can be seen between the towers. The present super-power WGY antenna is of the T-type, and is suspended between two of the 300-foot towers, one of which also supports one end of the 1560-meter antenna. Near this tower is the main building containing the power plant, also the sets feeding the two antennas just mentioned. This is the largest building in the picture. Coming from this toward the reader we find the 2XAD station house almost at the center of the triangle of towers. From this a road slants forward to the right, terminating at the 2XAW station-house next which is a row of 5 poles carrying a system of horizontal loops used in connection with 2XAC at wavelengths from 40-100 meters. Going to the left rear of the picture we find 2XK with its triple T antenna supported by three white masts. Directly in front of that are the small building and black mast of 2XAF which is described in detail in the text.



THE MULTIPLE-TUNED ANTENNA FOR THE 1560-METER STATION

The drawing is not to scale but represents the arrangement. The arrows are to indicate that at a moment the currents in both leads go in the same direction, not opposite as would be the case for a loop. This system acts as two "L" antennas in parallel.

connected in push-pull and neutralized. Plate modulation utilizing four UV-207's is used on the last stage when telephony is wanted. Thus it is seen that for CW only seven tubes are required by this system to

obtain a crystal controlled output of 20 kilowatts and that only two neutralized stages are employed.



THE ANTENNA SYSTEM AT 2XAF

The dark spot half way up the antenna is a split tuning coil with the antenna ammeter between—See Fig. 1. The ammeter is read by means of a surveyor's transit set out in the field—sometimes in 4 feet of snow.



CRYSTAL CONTROL OF THE 32.79 METER STATION 2XAF

A short time before the photo was taken there was being used a carefully shielded arrangement with some plain stages and some push-pull stages, all of which were neutralized. The much simpler device in the picture is now used. It is described in the text.

This is an ideal system for amateur use in that by the use of one 160-meter or one

80-meter crystal one can have a crystal controlled transmitter for use on 20, 40 and 80 meters with the minimum number of tubes and neutralized stages.

The antenna used at 2XAF is a halfwave vertical antenna, no ground or counterpoise being employed³. The output of the trans-



INTERMEDIATE AND FINAL STAGES OF THE 2XAF TRANSMITTER

Behind the "barndoors" panel is the UV-204-A stage. Tuning condenser control discs project thru the slots in the panel while meters are located far enough behind the circular openings to be safe from accidental contacts. At the left is the final stage with a pair of 20-K. W. UV-207 tubes in push-pull arrangement. Note that the water-cooling jackets of these tubes are mounted on springs to absorb vibrations which would cause a "burr" on the outgoing signal. Such sounds are often heard on these short-wave Schenectady stations but they are caused by audio fading after the signal leaves.

mitter is not coupled directly to the antenna but is carried over a transmission line about thirty feet long to a tuning house directly at the base of the antenna. A tank circuit is coupled to the end of the transmission line, the lower end of the antenna being coupled to one side of the tank by a very small coupling condenser.

2XAF has been rebroadcasted very successfully on several occasions in Johannesburg, South Africa and also in England. It has been heard with loud speaker volume in New Zealand in broad daylight.

A.R.R.L. Work in the Tests

Of the letters sent out by the Radio Engineering Department of the General Electric Co. about 22% secured observers for the "April tests." This refers only to the

³. This is what we would call a Hertzian antenna working at its fundamental. The details are shown in our Photographic illustrations and Fig. 1.—Tech. Ed.

2000 letters sent to men whose names were suggested by the writer—that is to say, the Technical Editor of *QST*. This percentage is unusually good.

Needless to say the returns are not yet complete as this is being written on the 20th of April. Even after all reports have arrived there will be a huge amount of work ahead before any results can be announced. Only those who have taken part in such a job can understand fully what a terrifying amount of time is required to finish the job. Do not be too impatient for information—very probably months will pass before the analysis is complete.

The Rest of Our Report

Because of the space consumed by the station description the rest of the "X" report must be dropped out this month. It will appear in the next issue.

The complete list of the stations at South Schenectady is as follows, the list being

Thru the courtesy of Mr. Alan Rockwood we are able to present the complete list of the stations at South Schenectady.

Station Call South Schenectady	Wavelength assigned	Wavelength April 27
2XAD	10-50	26.00
2XAF	10-50	32.79*
2XAG (Super WGY)	379.5	379.5*
2XAH	1000-400	1560*
2XAK	100-200	—
2XAW	32-0	16
2XAZ	100-200	—
2XH	50-150	—
2XK	50-150	65*
2XO	10-50	***

At Schenectady

2XI	Unlimited
Broadcast service to Oakland, Cal.	20.50
Propagation experiments	53.00

* Broadcasting the regular WGY programs.

The West Gulf Division Hamfest

HERE ain't no picture BUT—we got 'em told big boy, we got 'em told! Down here in this neck of the woods, where you ride all day before you can see your nearest neighbor, radio hams are not as prolific as they are in the more densely populated sections of the North and East, and consequently such things as "hamfests" and Division Conventions cannot be had quite as often or quite as easily as elsewhere.

However, the germ of "get-together" has been silently leavening the radio mixture in and about Dallas for two years and spontaneous combustion took place and we blew most of the roof off of The Hilton, one of Dallas' leading hotels, March 27th.

The Dallas Radio Club sponsored the idea and worked hard for two months to pull the first Amateur Hamfest ever held

in the West Gulf Division. Lots of 5-watt bottles had their bases melted off while somebody was being told about the affair and being urged to come.

5NW held a three day argument with 5ZA and finally 5ZA told him he was catching the last train out to Dallas with the OW under one arm and the baby under the other. When 5ZA was introduced as coming a long way to attend a good thing, as being a winner of the Hoover Cup and as being persuaded by 5NW, he brought down the house.

Inspector McCabe gave examinations all day and got more enjoyment out of the blow-out than a half dozen others. The Dallas Radio Club certainly appreciate the courtesy extended by the fifth district inspection department in arranging to have Inspector McCabe attend. While there was an arranged program, the meeting turned out to be more of a love feast than anything else and ham gossip thoroughly saturated the atmosphere between the splendid talks of Division Manager Corlett, Assistant Division Manager Forest, Inspector McCabe and several others that lack of space prohibits mentioning.

It is to be realized that great distances had to be covered by a portion of the two hundred who attended. There were amateurs from Beeville and Corpus Christi, Tex.; Magnolia, Arkansas; Norman, Oklahoma; Roswell, New Mexico, and possibly one or two other distant points and practically everybody that could get away from work or school within a hundred mile radius of Dallas. We were even favored with the presence of Señor R. A. Carranza, in charge of short wave communication in the Mexican Army.

5FC, operated by Whitaker and Lovelady, was represented by a glass-mouthed, silver-plated 40-meter transmitter of very excellent design. Part of the program was devoted to an explanation of transmitters in general by Mr. Lovelady. 5VF was represented also by a 40-meter silver-plated artistically arranged transmitter, which was also described by its owner, Mr. Hardy. There were so many more things crowded into the three or four hours following the banquet that they cannot be mentioned, but all served to make the meeting a success. A resolution was introduced and passed with great acclamation that Dallas make a bid for the National Convention next year. This resolution followed a very excellent talk by Z. E. Black, convention manager of the Dallas Chamber of Commerce.

The Dallas Radio Club thanks each and every one in attendance, individually, for the help and cooperation given.

The Hilton Hotel helped us very graciously and placed their every service at our disposal.

—“Rip” Bennett.

The Taurenwerfer Beam

By Morris Taurenwerfer, Associate Editor

Editors Note: Readers of QST will recall with pleasure the interesting article by Mr. Taurenwerfer in the January 1925 issue of QST. Shortly after we staged this scoop Mr. Taurenwerfer left our organization (not at our request) to enter the Research Department of the Chinese Telephone Company. It is indeed a great pleasure to have him back with us as an Associate Editor of QST after his eight successful months in China, where several revolutionary things were unearthed.

COUNTLESS hundreds of amateurs have written me for advice on transmitters. They assumed from the fact that I know a great deal about receiving circuits, I also must know the transmitting game equally as well. Frankly, my knowledge of amateur transmitters was extremely limited at the time I left here to go to China. While in China, however, I had a lot of time to investigate the mysteries of transmitters and transmitting circuits and, having an excellent basic knowledge of radio, it was but the work of a short while until I had mastered the transmitter. During the process of learning about transmitters I stumbled upon several new things, which other great minds, apparently, had overlooked.

One of the first problems I tackled was this business of beam transmission. Many people (notably Marconi, the R.C.A., Round and others) have gone at the problem in a perfectly normal and orthodox fashion. Not I. I do not do things in such fashion. I preferred to attack the beam transmitter from an entirely unlooked-at angle. And as is customary with me, I succeeded notoriously.

In the first place it is a well-established fact that the rays from an electric lamp or arc lamp when properly focussed in a parabolic reflector will be reflected into a beam of light which can be pointed in a particular direction.¹

Light will be transmitted in one direction only. Here is exactly what we want in a radio beam transmitter transmission in a particular direction; concentration of light energy.

Let us pause for a moment and see exactly what light is. There are two popular concepts of light. One, the emission theory, would cause us to believe that particles of the light-giving body actually travel out into space and are actually hurled from the light source to the receiver. To my mind this theory is absolutely and unmitigatedly the bunk. It is inconceivable to me that when I look at a Ford car particles of this car actually fly out at me. I take the Ford

as an example because if any substance is in a condition in which it might fly out at anyone, the Ford product is in that shape better than anything else. Going a step further, assuming that this theory is the correct one, if I looked at the Ford long enough, the particles would continue to fly off from said "car" until it was no longer

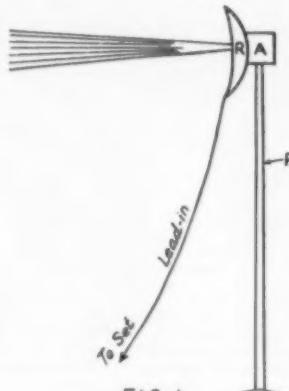


FIG. 1

THE TAURENWERFER BEAM REFLECTOR AND TRANSMISSION POLE

where I first saw it but actually became a part of me. Admittedly impossible.

The other theory is called the undulatory theory. It assumes that the ether (which no one as ever seen, tasted, heard, measured or actually known of) is set into rapid and violent oscillation by the illuminating object (the sun is a shining example), and that said ether is filled with waves which travel from the light source to the observer. This is the logical light theory—the theory which I have accepted without reservation. I have gone a step further and have combined, in practice, the theories of light and wave propagation and have succeeded in establishing beam transmission from China to the United States when using a tube with a negative B-battery voltage of 8.61 volts.

Turn to Fig. 1. A few words will expose my simple beam transmission system which

* Radiotrician & Assoc. Member A.R.R.L.
1—M. Taurenwerfer, "Light and Darkness," S. African Radio News, Mar. 1899.

I have called, out of respect to a great engineer and research worker, "The Taurenwerfer Beam". An ordinary D.C. arc lamp (A) is attached to the top side of a 42-foot steel pole P. To the arc lamp (A) the reflector R is clamped. The pole is hollow and is mounted on a revolving platform so that it, the arc and the reflector can be rotated through one complete revolution. Through the hollow portion of the pole the arc feeder wires are run. The arc is a series affair operated in series with the commutator of a 2,125 R.P.M. 500-volt D.C. machine. When the arc is turned on it is obvious that the reflector will emit a beam of light, and that the direction of this beam can be changed by rotating the pole.

I have previously shown that the light beam from the reflector is merely a vibration of the ether in that direction. In other words the ether is highly excited. If I now couple a radio transmitter to the light source so that the radio frequency is applied to the center of the reflector, the radio frequency waves will set up vibrations along the light path, and as the ether along this path is already regenerative due to the light vibrations, the super-imposed R.F. will cause the ether to become highly conductive and the radio waves will travel readily and quite rapidly along this light beam.

The theory of the Taurenwerfer Beam was tested in the Laboratory at first and was found to be correct. I was worried for a while as to what would happen when the radio excitation reached the end of the light ray. I reviewed all available literature on the subject and found that the solution had been found years ago.² The light beam allows the radio wave to get a good start and

ordinary directly coupled Hartley circuit, the coupling being accomplished by several gadgets in the lead-in. In order to suppress as many harmonics as possible, and at the same time eliminate key clicks, I had to resort to some new tricks. The primary inductance L1 is completely shielded from itself. I found that most of the BCL interference was caused from direct pick-up from the primary. This was eliminated by winding L1 in the following fashion: The conductor itself is number 28 magnet wire. This

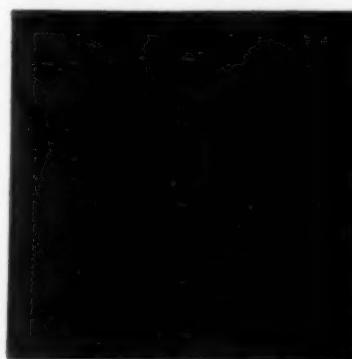


FIG. 3

MR. TAURENWERFER OPERATING HIS BEAM TRANSMITTER—BEAM SHOOTING NORTH

wire has a much smaller external field than any other wire made. In order to make the No. 28 carry the enormous current I used. I enclosed it inside a three quarter inch brass pipe filled with oil. This pipe is insulated from the No. 28 wire which is the conductor by the oil. The pipe, in turn, is grounded through a non-inductive resistance tuned to twice the second harmonic of the working wave. All direct magnetic or static fields about coil L1 have been eliminated by this type of construction.

Interference, mush, sidebands, carrier waves, static, doubly suppressed carrier waves with no side bands and re-radiation in the antenna were all eliminated by that equipment shown in the dotted lines at the left. For the want of a better name I have called this a Taurenwerfer Suppressor. The condenser C is insulated to withstand ten thousand volts, and will carry two hundred amperes on 46 meters. The inductance L is a coil of number 24 D. C. magnet wire wound on an iron core made of .0002 mil audio-frequency brass, and the resistance R has a value of .01052 megohms. The capacity of C will vary according to the well-known Austin-Cohen formula (incidentally developed independently by the writer while at the BuStan). Its capacity will be found

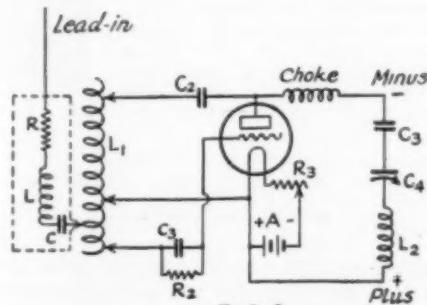


FIG. 2.

THE TAURENWERFER CIRCUIT

the radio wave travels on and on after it has left the end of the light, and still goes forward as a circularly polarized wave.

Several novel things will be found in the diagram of my transmitter used in connection with the Taurenwerfer Beam. The circuit, at a casual glance, appears to be an

²J. H. Newman, "Lead Kindly Light."

to be between .002 μ fd. and .00204 μ fd. when the 46-meter wave is used.

It will be noted that I use a negative potential on the plate of the tube. This is made possible through the judicious use and choice of C3, C4 and L2. When these units



FIG. 4

THE TAURENWERFER BEAM WORKING IN A SOUTHERLY DIRECTION. MR. TAURENWERFER CAN BE SEEN AT THE RIGHT OF THE TWO TALL TREES AT THE LEFT, RIGHT BETWEEN THE PALE GREEN ELEPHANTS

are properly used and installed, regeneration in the tube is so strong that the tube takes full advantage of the negative resistance phenomenon, and operates with a negative voltage on its plate so long as the oscillations in C3-C4 and L2 circuit are 90 degrees in phase with the voltage of the A-battery, in which case the current lags by a phase difference of one hour and ten minutes.

As I have a patent application on this latter feature I would request that the amateurs do not experiment with this feature of the circuit. You can rest assured that there is no chance of your being able to improve upon the circuit as I have gone all through all the possible ideas for improvement and this is the circuit in its final form.

At a later date I hope to be able to explain to the waiting world several other things I discovered while in China. Although there only eight months I succeeded in doing a lot of new things which the radio press has not been advised of. You, as readers of *QST* are entitled to a first hand account of all of these discoveries as long as I am connected with this organization. They will be divulged later on.

Buying Inductances By the Inch

A NEW type of receiving inductance is now available. The coils are wound on a thin sheet of transparent dielectric .005 inch thick. Turns are spaced a distance equal to the diameter of the wire. At present two stock sizes are obtainable. For receiving coils the inductance is three inches in diameter and is wound ten turns to the inch with number 16 cotton-silk insulation. The coils are extremely strong, it being almost impossible to compress them out of shape. For R.F. chokes and ticklers in amateur short wave receivers inductance material of a different type can also be had. This inductance takes the form of a coil one and one-half inches in diameter, wound with number 36 single silk covered wire. The wire is wound ninety turns to the inch, the spacing being about equal to the diameter of the wire.

If you are an amateur and will give your call letters, either type of inductance may be purchased by the inch in lengths up to 20 inches. These coils should make excellent S.W. receiver material. They are made by and can be purchased from the Hammarlund Mfg. Co. of New York City.

In order to have as much short wave data on the products they make, Hammarlund is also offering a 25% discount to amateurs, on all of their receiving and transmitting condensers suitable for amateur work. When writing you must give them your call letters as they will sell only to bona fide amateurs.

—J. M. C.



Strays

The 300, 600, and 706 meter waves of Great Lakes land stations and ships have been replaced by a 715 and 876 meter wave. The gulf land stations have moved up to 750, 900 and 925 meters and the ships from 650 to 700.

If the owner of a station will go to the post office of his city and register his station call with his address, all mail addressed only with his call and city will come to him and the dead letter office will be robbed of a few morsels.

An Oscillator Without Battery or Transformer

By Allan T. Hanscom*

THE writer has designed a convenient portable oscillator for laboratory work and receiving set testing. It can be operated from 110 volts A.C. without the use of any batteries.

Figure 1. represents the conventional Hartley transmitting circuit. By properly proportioning the inductances L_1 and L_2 and the condenser C , the tube may be made to oscillate throughout a 3 to 1 range of frequencies. For any given range the experimenter will know from experience what size of coil and condensers to use. It is usually satisfactory to center-tap the coil.

Figure 2. The same circuit with 110 volts A.C. applied to the plate circuit of the tube. In this case the tube will act as a rectifier although it will still continue to oscillate at a frequency governed by the constants above mentioned. Figure 3 shows

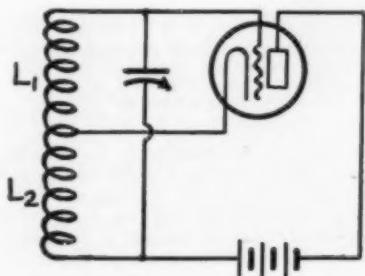


FIG. 1

a method of heating the filament of a tube with 110 volts A.C. which requires no transformer. By combining Fig. 2 and 3 we have Figure 4 in which the filament and plate supply are both from the same source. The resistance R . in the filament circuit consists of a 25-watt lamp and the voltage drop through this lamp is 105 volts when connected in series with a standard 201-A tube. It will be noticed that the grid return of the tube is connected to the opposite side of the 110-volt line from the plate return.

The rectified plate current is a series of impulses and because 60 cycles a second is an audible frequency, the frequency of oscillation is modulated so that an audible signal is produced in a receiving set placed within 50 feet of the oscillator. The reason for connecting the grid return as indicated is that the end of the filament to which it is connected is negative at the

time that the plate of the tube is positive and this is the only time that plate current is flowing.

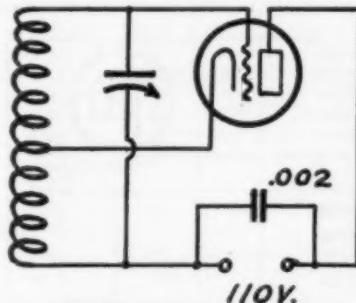


FIG. 2

When a 201-A is used in this oscillator the total plate current, as measured by a D.C. milliammeter, is less than two milliamperes. Using a 6-tube Superhetrodyne on a loop, the signal of this little oscillator has been picked up at a distance of 500 feet, although the practice of using this tester as a transmitter is to be discouraged because the tone is that of "raw A.C." moreover, in the standard commercial form of the tester, the circuit constants are arranged so that the wavelength range is from 180 to 575 meters. If 110-v D.C. supply is available the tone will be good and a neat little transmitter of the "fractional watt" type results when one uses a condenser and coil proper for one of the

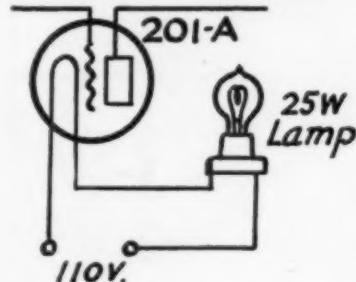


FIG. 3

amateur bands. Coupled to an antenna such a set should work around town fairly well—tho it would not be possible to operate an antenna meter—not even a thermo-galvanometer. One would need to use a plate meter (0-5 milliamperes)

* Hanscom Radio Devices, Woonsocket, R. I.

and go by its readings. Of course, the reliable range of any set with an input of 2/10 of a watt is not likely to be astonishing but freaks are possible.

It will be noted from the diagram Figure 4 that the A.C. supply lines are connected at the low potential end of the system. Even though this is the case radio frequency currents seem to follow the lighting

signal on any wavelength, and this wavelength can be varied to suit the operator by means of the tuning condenser.

The dial has wavelength indications on it and while the device is not intended for a wave meter the readings are accurate enough to form a good indication of the wavelength range of a set.

In the Hartley circuit as indicated in

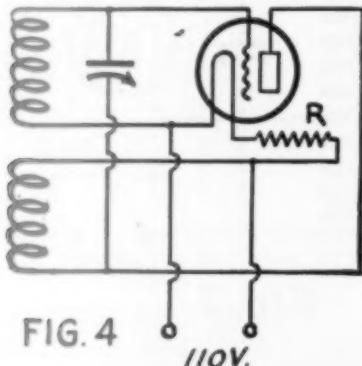


FIG. 4
110V.

supply lines.' For this reason it is sometimes better to test the receiving set with the ground disconnected, except in the case where the antenna and ground form a

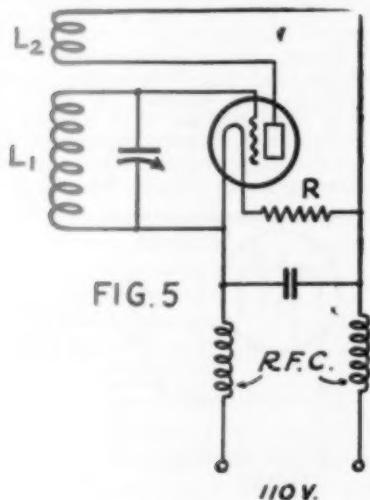


FIG. 5
110V.

tuned circuit and one is obliged to put up with this uncertainty.

All radio repair men will welcome this device for its ability to provide a clear

1. A Common source of interference. The R. F. of amateur transmitters (especially those using "voltage feed" to the antenna) frequently gets into the 110-volt line and runs all over the neighborhood, arguing with the harmonics of the superhetrodynes it meets.—Tech. Ed.



THE COMMERCIAL FORM OF THE OSCILLATOR
This device is called the "Superunit set tester" and has a wavelength range of 200-575 meters. The dial carries both a wavelength scale and a 0-100 scale.

Figure 1 there is a tendency for the oscillations to cease when C reaches a certain value. It is therefore to some advantage to use a circuit of Figure 5 in which a tuning condenser is placed across the grid coil only. The inductance of L₁ should be sufficient to cover the wavelength band when used with an .0005 condenser and L₂ should have sufficient turns to insure the oscillation of the tube at the high wavelength settings. The coupling between L₁ and L₂ can be extremely close. It is also possible to insert chokes in the supply line as indicated in Figure 5. In this case the radiated signal will be much less and the effect on the neighbors will be less in proportion.

Strays

The long awaited revision of Ballantine's hamble is not to be. In the meantime a reprint of the last edition is going on and once more "Ballantine" is available. The price is \$2.00 and it is well worth ten times that much. Our Book Department will get it for you.

Starting at 8:50 p.m. E.S.T. 8ZU at Cornell University copied fifty-one CQ's from 9BDQ, all of them in a string and with no let-up. Honestly, gang, how long is this punk operating going to last?

A. R. R. L. Standard Frequency Station 1XM

By Killian V. R. Lansing*

1X M is the experimental station of the Massachusetts Institute of Technology Radio Society.

The Radio Society has two main activities, technical meetings and its experimental station. This article will describe the latter. Technical meetings are addressed by members of the M. I. T. faculty, advanced students, and speakers from the outside, many of them nationally known in radio and allied fields. The present organization of the M. I. T. Radio Society was started shortly after the war by a group of students, many of whom had been in the Government signal service during the World War.

The Station and Location

The station is located in the second story of a three-story steel framework building. Next door is the M. I. T. power house, whose smokestack, only about seventy-five feet from the station window, makes a conven-

ient mast upon which to fasten antennas. The presence of the power house, however, is thought at least partially to account for the rather poor receiving conditions that seem to exist. A railroad beside the building accounts for additional QRM.

Due to the experimental nature of the station frequent changes in apparatus are made, and only the station as it happens to exist at present can be described here. No regular operating schedules are maintained and so the number of reports from distant points is not large, though in proportion to the amount the station is on the air the reports are very satisfactory.

The receivers in use at the station, one of which may be seen in the center of Figure 1, are similar to those in use at most good amateur stations and need not be described here. The particular one shown has plug-in coils and is arranged for the 15,000, 7,500 and 3,750-KC bands. One stage of audio



FIG. 1
THE OPERATING BENCH
Standard Frequency Transmitter at the right.

ient mast upon which to fasten antennas. The presence of the power house, however, is thought at least partially to account for the rather poor receiving conditions that seem to exist. A railroad beside the building accounts for additional QRM.

Though the station has always possessed transmitters that were abreast of the times, it was in 1921 that the station first became well-known due to the installation of a 500-watt 500-cycle ICW transmitter, of the type which later became so well known at 2RK-2FP, 8AWP, 9ZN, and others. At this time transmission by the use of vacuum tubes was unknown to a large number of amateurs, and many inquiries were received asking how we obtained such an extremely sharp wave with our 500-cycle spark.

The majority of the apparatus of 1XM

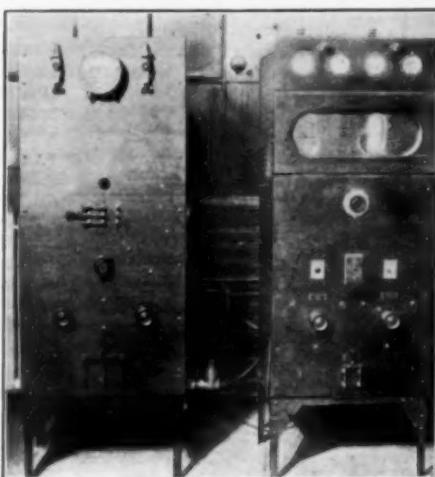


FIG. 2
POWER PANEL AND 100-WATT TRANSMITTER

amplification is generally used for amateur reception. The receiving antenna is one of about 30-foot length on the roof of the building, purposely short to minimize pick-up of the many kinds of QRM from the power house and the varied electrical ap-

* Room 10-189, Massachusetts Institute of Technology, Cambridge, Mass., Standard Frequency Committee, M. I. T. Radio Society, Member A. R. R. L. official wavelength station committee in charge A. R. R. L. Standard Frequency transmissions, Experimenter's Section A. R. R. L.

apparatus in use at a great scientific institution.

The main transmitting antenna is suspended nearly vertical from the top of the powerhouse smokestack and consists of a

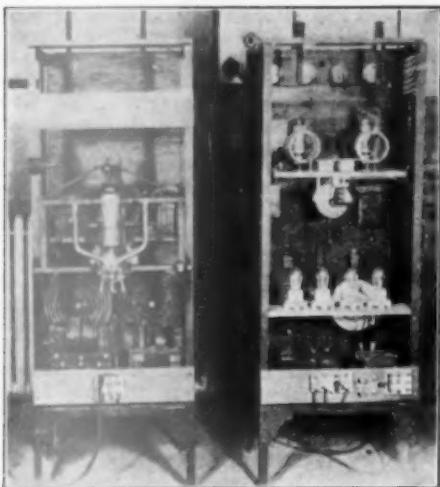


FIG. 3
REAR VIEW OF POWER PANEL AND 100-WATT
TRANSMITTER

Note arc-shaking solenoid at upper left of power panel. In the 100-watt panel the filament and plate transformers stand in the bottom of the frame, the "S" rectifier tubes on the first shelf and the oscillator equipment on the top shelf.

single enameled copper wire. The counterpoise is a horizontal wire directly beneath the antenna, and about twenty feet above the ground. A smaller antenna is suspended from a point part way up the smokestack. The same counterpoise is used with both. The fundamental of the larger system is about 2800 KC, a series condenser being used for operation in the 3750-KC band; the third harmonic of the system is used for transmission in the 7500-KC band. The fundamental of the smaller system is about 5000 KC; its fundamental is used for the transmission of Standard Frequencies on the Canadian exclusive frequency of 5710 KC, and the third harmonic for the 15000-KC band.

Figure 1 is a general view of the operating bench with the Standard Frequency transmitter in the background. A duplicate operating position with another receiver and duplicate transmitter controls is located just to the left of the telephone.

The Power Panel and 100-watt Set

Figures 2 and 3 show the front and back views of the power panel and the 100-watt transmitter. The left hand panel in Figure 2 contains the power supply for the Standard Frequency transmitter which will be described later.

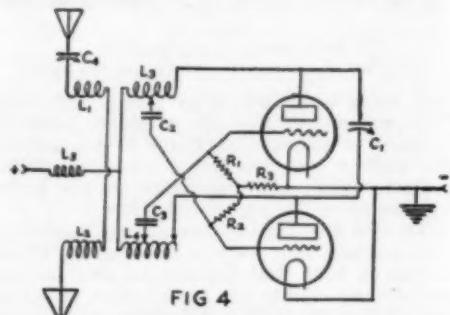
The right hand panel of Figure 2 contains the 100-watt transmitter. This transmitter uses the push-pull circuit shown in Figure 4. This should not be confused with the usual "back-to-back" scheme used in many amateur stations. The circuit is rather unusual in amateur stations, but is strongly recommended as very flexible and efficient. The single variable condenser shown will vary the frequency from about 9000 to 3000 KC; the only additional change necessary to QSY is the adjustment of the antenna circuit. The adjustment of the coupling will be found rather critical, but once adjusted the set will be found to function smoothly within the frequency limits indicated.

The two tubes are of Westinghouse make, rated at fifty watts output, and especially built with the plate leads coming out of the tops of the tubes.

The power supply for the 100-watt push-pull transmitter is obtained through an S-tube rectifier set and using full-wave rectification, located on the same panel as the transmitter. The voltage range is variable from 700 to 1500 volts.

The Standard Frequency Transmitter

Transmitter No. 2 was built especially for the Standard Frequency schedules. A very clear idea of this set may be gained from the photographs of Figures 5 and 6. The circuit employed is the familiar tuned-plate tuned-grid or Armstrong circuit, and is given in Figure 7. The tube is a General Electric type "P" pilotron, somewhat similar to the Radio Corporation UV-204, ex-



CIRCUIT OF 100-WATT PUSH-PULL TRANSMITTER AT 1XM

- L1, L2—3 turns edge wound copper ribbon
- L3, L4—turns, ditto
- L5—R. F. Choke, 150 turns
- R1, R2—5 megohms
- R3—10 megohms
- C1—1500 μufd. double-spaced
- C2, C3—2000 μufd. fixed Faradons
- C4—500 μufd. variable

cept for the heavy plate. Glass towel bars from a local five-and-ten-cent store make very convenient mountings for the coils which are made of $\frac{1}{8}$ " seamless copper tub-

ing. The plate-tuning condenser and the two grid-tuning condensers shown have $\frac{1}{2}$ " spacing, and were especially designed and built for the Standard Frequency service by the National Company of Cambridge, Mass. Though normally rated at 250 watts output, the tube is generally operated at from 200 to 300 watts input. This seems to "get out" just as well and minimizes frequency changes. This set has proved very flexible over the frequency range included in the Standard Frequency transmissions though it has more controls than the push-pull transmitter. It holds its calibration extremely well as will be noted in text to follow.

The Mercury Arc

So many inquiries have been received regarding the Mercury arc that its essential circuit is reproduced in Figure 8. The "pi" section filter shown may be cut in or out at will. The filter is generally used with the 60 cycle supply, but is sometimes cut out when the output of the 500-cycle motor-generator is supplied to the arc in order to get a 1000-cycle "overtone."

The Standard Frequency Work

Since it is the Standard Frequency schedules that have recently brought the station into prominence again, some description of the method by which they are adjusted may be of interest. All Standard Frequency transmissions are referred directly to the Standard Frequency meter which is kept in the M. I. T. Communications Laboratory. A small receiving set is adjusted to the exact frequency which it is desired to transmit by

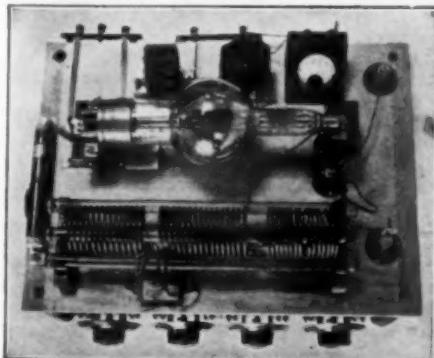


FIG. 5
TOP VIEW OF STANDARD FREQUENCY TRANSMITTER

tapping the box of the meter and varying the receiver controls until the sound is heard in the headphones. Once the receiver has been approximately calibrated this method proves faster than the common grid-reaction meter method, and fully as precise. The output of the receiver in addition to going into the headphones is sent over an ordinary telephone line to the transmitting station several hundred yards distant. The head-and-breast-set worn by the operator as he adjusts the transmitter controls and does the keying, may be seen on the hook in Figure 1. The Standard Frequency meter

dinary telephone line to the transmitting station several hundred yards distant. The head-and-breast-set worn by the operator as he adjusts the transmitter controls and does the keying, may be seen on the hook in Figure 1. The Standard Frequency meter

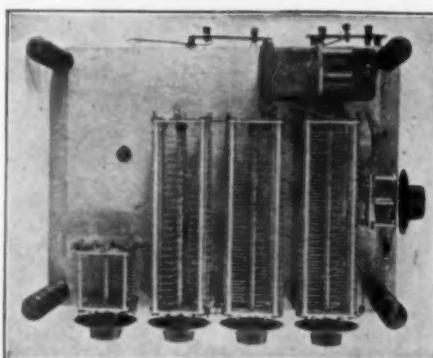


FIG. 6
BOTTOM VIEW OF STANDARD FREQUENCY TRANSMITTER SHOWING LARGE 250 μ pf. SPECIAL NATIONAL CONDENSERS

is shown in Figure 9. The coils, as may be seen, are made of very heavy copper tubing; the condenser is a General Radio Precision type with worm and gear drive for making close adjustments. The condenser is thoroughly shielded and grounded as is the entire heavy table to which the meter is permanently fastened. The transmitter having been adjusted to approximately the desired frequency by previous calibration, it is merely necessary for the operator to make vernier adjustments until he hears the signals coming back over the line. To avoid "broad" signals in the laboratory, the receiver uses neither antenna nor ground, and was especially constructed with a view to minimizing pick-up.

Precision

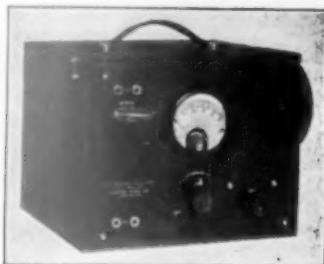
The transmitter holds its calibration so well, and the method of setting the receiver is so precise, that, with rare exceptions, an audio frequency beat note between the transmitter and the receiver can be heard coming over the line the first time the key is closed. It is then merely necessary to adjust to approximately zero beat. It is planned in the near future to adjust the receiver to the proper harmonics of an approximately 250 KC quartz crystal oscillator which has been furnished through the courtesy of the General Radio Company, and may be seen in Figure 10. This method will probably be in operation by the time that this appears in print, so that the "announced frequency" may then be expected to have an accuracy of 0.01 or 0.02 of 1%, thus making these signals of use to the laboratories as well as amateurs.

Clapp, (1BYX) an M. I. T. instructor, for many practical suggestions in putting this service into operation; to Messrs. Snyder (9BNO), Dresser (1BOB-1VT), Hilton (ex-



THE STANDARD FREQUENCY METER

1BRQ) who, with the writer, have done the actual operating of the schedules; to Mr. Briggs (1BVL-1GW) who did a large portion of the construction of the Standard



GENERAL RADIO CRYSTAL OSCILLATOR

Frequency transmitter; to Mr. Snyder who built the power panel and did a large portion of the wiring; to Mr. Dyson who built the 100-watt transmitter; and to numerous others who have helped at times.

We have just been informed that the Pliotron has at last burned out. It has been replaced by a Mueller MS-1 tube rated at 500 watts output but operated at inputs of 100-400 watts depending upon the frequency that is being transmitted. This tube is available for this work thru the courtesy of the Tobe Deutschmann Co., Cornhill, Boston, Massachusetts.

—R. S. K.

The Maritime Division Convention

ANOTHER of those fine little conventions has been pulled off. The Canadian Maritime Division held its third convention in St. John N. B. on April 23rd and 24th. It was a convention typical of the kind we used to have in numbers, years

ago; a collection of keen brass-pounders intent upon having a good time, transacting some business and enjoying an excellent banquet.

The convention was staged by "skipper" Atkinson, c1AK. Representatives from all the Maritime Sections save Labrador were present. Reid of c8AR came all the way from that distant Newfoundland country; Bill Borrett (need we say c1DD) and Campbell, c1DJ came from Halifax, Hyndman c1BZed represented Prince Edward Island and the gang from N. B. was both large and lively.

The first afternoon was taken up in getting acquainted. The banquet was held during the first night in the Admiral Beatty Hotel. Atkinson presided. Mayor Frink of St. John opened the fireworks by welcoming the gang to the city. Palmer of c1AM accepted the welcome. The Mayor then presented this year's Murphy Cup award to Joe Fassett. As Joe was not with us Bill Borrett accepted. Then followed a series of talks, a wire untying contest, a nose key-punching contest, a diagram reading and correcting contest, a best Liars contest and several other prize winning features. Betwixt and between, the gang ate a delicious meal. Reid gave a short talk advertising the wonders of Newfoundland and then the initiation into the Royal Orders of Transatlantic Brass-pounders was staged for the benefit of six novices who having previously crossed the Atlantic via Radio were taken across the burning desert partaking of the Sacred Worms en route and finally emerging full-fledged ROTAB members.

The next morning the St. John street-car was chartered and the town was given the once-over.

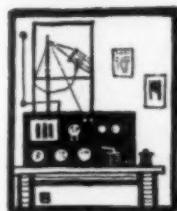
That afternoon a business and technical session was held. Maritime Division business was transacted, Bill presiding. Two excellent technical papers by Prof. Ritchie were read by Borrett and a general hamfest followed. The night session took place in the hotel rooms, part of the gang listening on Bills S/W receiver, part trying to make his S/W low power transmitter transmit and the rest chewing the sock.

All in all this was the type of convention we love to attend. Enough fellows to make it most interesting and not so many fellows that personal contact with all was impossible. A most convivial and congenial gang of darn good sports. F.B. OM's. Long live Canada and QLC, but especially *Vive La Maritime!*

—J. M. C.

Strays

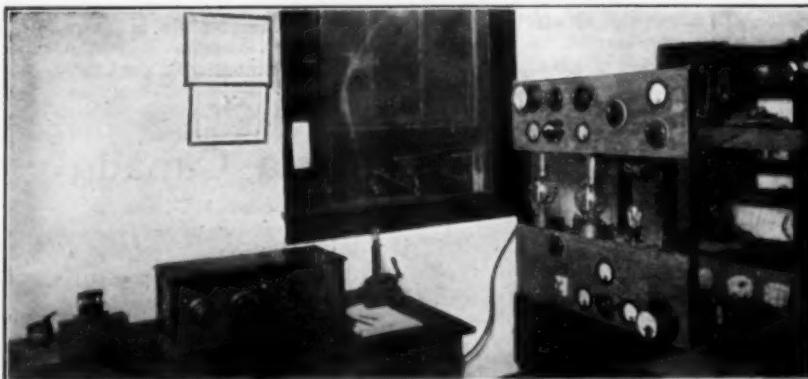
The A.R.R.L. Communications Manager, Mr. F. E. Handy, and Miss Winifred G. Richardson, formerly of A.R.R.L. Headquarters, were married in Hartford on April 17th, and have been receiving congratulations from the gang.



Amateur Radio Stations



4BY, Savannah, Georgia

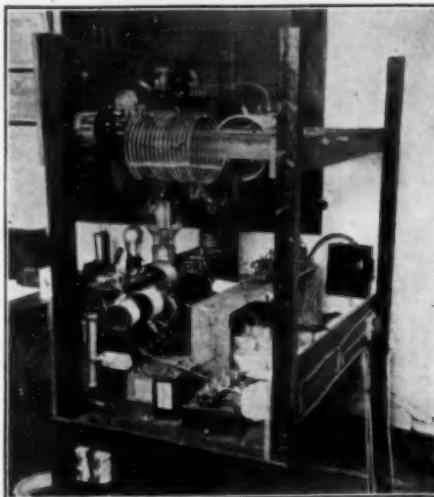


THIS is the crystal-controlled station of J. E. Hodge, 143 Bull Street, Savannah, Georgia. 4BY is an old timer and has been described in *QST* previously. The former station used two 204's built in as compact a set as possible. The present 4BY is the reverse of the old one—there is plenty of room for a couple 1 K.W. tubes and still space for one to crawl into the set and not have to tear down the whole works to change a grid leak!

4BY was one of the first crystal-controlled stations in the country. The present set uses a UX-210 crystal oscillator and two 204 power amplifiers. The frame work and panels are of poplar boiled in paraffine for half an hour. The crystal and oscillator tube are located conveniently on the small shelf between the two panels. The crystal oscillator's filament voltmeter, high frequency ammeter and tuning condenser are directly beneath the UX-210. The crystal oscillator grid inductance (small picture) is directly to the right of the oscillator tube. This inductance is an 8 turn coil of No. 14 wire, spaced by means of knotted flax thread. The turns are spaced 1/16th inch and are 4 inches in diameter. Plate voltage is 400, with a grid bias of 22½ volts.

The power amplifier inductances are cut away R.C.A. helices spaced with glass beads and supported on glass rods. For 80-meter

work 12 turns are used in both helices. For 40 meters the helix in the last power am-



REAR VIEW OF TRANSMITTER. PLENTY OF ROOM HERE FOR ANY EXPERIMENTAL WORK

plifier circuit has only 5 turns, the first power amplifier remaining on 80 meters. Normally 1,000 volts are used as plate

voltage for the two power amplifier tubes. With a 90-volt grid bias the plate current is 125 milliamperes per tube.

Three separate filament heating transformers are used. With this arrangement, a master rheostat (on the front of the panel) can be used to adjust all filaments at the same time.

The change-over switch shown on the table is the only switch used. This, on the send side, connects the antenna and counterpoise to the transmitter, starts the M. G. set which is in the garage, turns on 220 volts to two of the filament transformers and 110 volts to the other transformer, and also sets the relays that are used for keying. Keying has been done in a variety of places. Keying the last power amplifier bias circuit and the antenna simultaneously gives no back-

wave but gives rise to fierce key thumps. Keying in the center tap circuit of both power amplifiers results in less key thump and still keeps out the objectionable back-wave which is due to the crystal oscillator running all of the time.

As this is an experimental station the note varies directly as the crystal in use at the moment. At times the note is not good but invariably the wavelength stays put and the note steady.

Neutralizing of the power amplifier circuits has been tried with negligible success. This is probably due to the fact that the input to the power amplifiers is so far below normal rating that serious feedback rarely occurs. The circuit is more or less the standard one, with no shielding of the crystal oscillator grid coil.

c4GT, Calgary, Alberta, Canada



THIS very excellent station is the product of years of work on the part of

A. H. Asmussen, owner and chief operator. The station started off with the two 250-watt DeForest tubes hanging on the wall. Due to a heavy overload they passed out of the picture soon, and were replaced with a single Northern Electric (W. E.) 250-watter. This latter tube has been used regularly for over two years and a half. Asmussen has made a careful study of low input into over-size tubes, and believes that the main trouble with amateur operation is overloading the tube in the transmitter. The input to the 250-watt tube has never exceeded 200 watts. Some of the stations very

best DX has been done with an input of only 120 watts.

The transmitting circuit is the familiar Reinartz type. Six variable condensers are used. In fact the only fixed condensers in the transmitter are the filament and plate by-pass condensers. The inductances consist of twelve turns of 3/16 inch copper tubing wound to a diameter of six inches. The turns are spaced by glass beads threaded on a string. Plate voltage is supplied to the tube from a 1100 volt power transformer, via a synchronous rectifier. The filament transformer has a center tap to which grid and plate returns are connected. In addition there is a 300 ohm potentiometer

connected directly across the filament leads, the arm being connected to the filament center-tap. 4GT says that this helps materially in clearing up the note. The filament rheostat is a home-made carbon pile compression type.

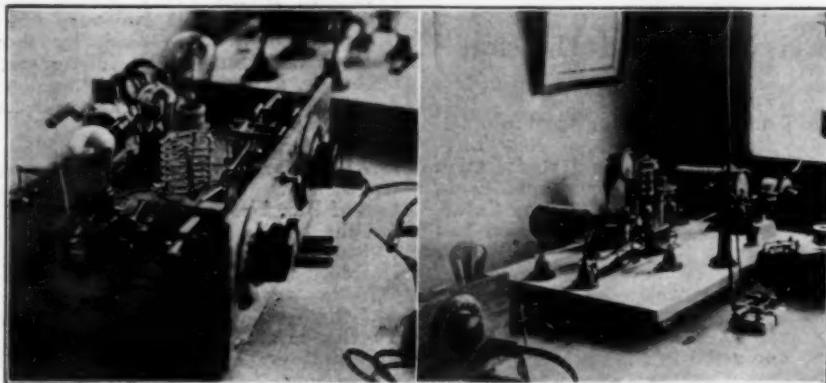
There are five different aerials at the station. One of them is a thoroughly insulated wire buried in the ground. Three separate ground connections and two counterpoises are also provided. By means of the switches on the panel at the extreme right, any combination of antenna, counterpoise or ground can be picked up.

The receiver mostly used is a Reinartz-Weagant-Schnell-Austin-Young type rebuilt, remodified and rehashed every now and then. Directly behind the receiver is a small A-and B-battery panel. By means

of the Jones plugs and jacks on this panel any B-battery voltage from 2 to 200 can be readily plugged in and the A-battery (two 6-volt ones) can be put on the set or on charge. The Ultradyne superheterodyne on the shelf above the receiving tube rack is used for short wave work occasionally, although it is not as good as the standard short wave one on the table.

The DX at this station has been exceptional. Schnell on NRRL reported c4GT's signal as one of the most wicked, if not the strongest, he regularly heard. QSO with Australia and New Zealand goes on almost as regularly as clockwork. The station log is always kept up to the minute and is arranged so that the operator can tell in a short while exactly when a certain station was heard or worked and what the signal was like. A fine job, indeed, OM.

7AY, Eugene, Oregon



THIS station has been in operation for about one year. It is manned by W. E. Slauson, an old timer hailing originally from Monticello, Iowa in the pre-war spark days.

The transmitter consists of one 203-A tube operating in tuned-grid tuned-plate circuit. Parallel feed is used and the plate supply, 1000 volts of rectified A. C., is supplied by a transformer and two "S" tubes. Regulation of the input to the "S" tubes is provided for by a three way switch, a sixty watt, 110-volt lamp being connected in series with the primary of the power transformer to warm up the "S" tubes before the evenings operation starts. A filter of 4- μ fd. by-pass condensers and a 50-henry choke are used. The note is reported as being almost pure D. C.

The transmitting inductances are made of copper tubing. Eight turns are used in the

grid coil, nine turns in the plate coil and five and a third turns in the antenna coupling coil, for 40-meter operation. The coils can be interchanged almost instantly. Three turn coils can be substituted for the eight and nine turn ones for 20-meter work. Two 140-turn R. F. chokes are used, one in each high voltage supply line. The chokes are of number 30 wire on forms an inch and an eighth in diameter. The transmitter is operated a little below the fundamental for 40 meters and on the second harmonic for 20 meters.

The antenna and counterpoise lead-ins come in through the windowpane at the right of the transmitter. The antenna is a four wire vertical cage, 37 feet long. It is supported by a 57-foot self-supporting pole. The counterpoise is a "t" affair about 50 feet long. Plate glass insulation, and plenty

of it, is used in both antenna and counterpoise.

The receiving set is also a tuned-grid tuned-plate set, using 201-A tubes. It has one stage of audio frequency amplification. Plug-in coils are provided to cover all wavelengths between 10 and 90 meters. The National condenser on the right of the panel is trimmed down to 4 plates. This is the secondary tuning condenser. The regeneration condenser is a 250 μ ufd. Bremer-Tully, at the left of the panel.

The transmitter and receiver are mounted on shock-proof pads. Care has been taken in the choice and location of all insulation and in the arrangement of apparatus in order to get best results. A Seattle Radio Lab wavemeter is almost indispensable.

7AY has worked (on 40 meters) 14 countries, has been reported in 3 others, has worked AQE near the South Pole and has been heard by ships in East India, China and East of Madagascar in the Indian Ocean. Eugene is a very unfavorable location for reception of African and European stations.

The New England Division Convention

BRIGHT and early Friday, April 9th, delegates from all sections of New England began to arrive and registration at the Hotel Biltmore, Providence, R. I., showed a total attendance of 250 by Saturday afternoon. The Hudson Division had ten members present and a few from other Divisions were in evidence.

Chairman Young welcomed the delegates at the first meeting and then turned the meeting over to A. A. Hebert from headquarters, who acted in the absence of Division Manager Cushing, who was late in arriving. A detailed explanation of the new Communications Department was given and discussions took place afterwards. A very good address was given by Mr. Roger Williams of the Ceco Co. of Providence on Vacuum Tubes.

The first evening was given entirely to entertainments and a number of worth-while stunts put on. The Boston fellows had a skit that provoked some mirth; the P.R.A. String Quartette, assisted by one of their Y.L.'s, played Hawaiian Dance music. "Dark Waves, or the Providence Radio Assn. in 1960," was well staged and Maney was F.B. in his "technical talk." The time-honored Cracker Eating contest produced as much fun as ever, and for the first time in our knowledge was participated in by the Y.L.'s; 1KY and 1AID showed themselves real "hams." The Liar's contest was pulled off, but the platform evidently made the competitors self-conscious and it was not until 2BW (Doc. Walsh) got started that competition became strong. All honors were car-

ried by Doc. Walsh, and to quote from one of the newspapers, "such an exhibition should land him in the General Assembly."

Saturday was certainly a full day with examinations for licenses by Inspector Butterworth; a trip to WJAR and the afternoon lectures so well handled by the different speakers. Prof. C. W. Miller of Brown University spoke on "The Contribution of Radio Amateurs to Pure Science;" Doctor Elliott White of Dartmouth College was interesting in his topic: "Transmitting Tube Adjustment." Mr. S. N. Read, 1CRI, gave us something to think about on, "Radio Pictures," and if our experimenters will only get busy now it will not be long before we can see each other at our sets.

Both Johnny Reinartz and Fred Schnell made everyone feel envious of their respective trips so well described, and there is no doubt that future expeditions will have no trouble finding men to go along as radio operators.

The Banquet, with Director White as Toastmaster, was unusually good. Our President, Hiram Percy Maxim and Mrs. Maxim, both gave us two very fine talks. Other addresses were made by Treasurer Hebert, Radio Supervisor Kolster and D. A. O'Connor, President of the Providence Radio Association, under whose auspices the convention was held.

The Grand Finale was a 3-act play, "How it All Began," written by 9DIP, and well staged by the Radio Transmitter's Association of Hartford, who deserve a lot of credit for the hard work put into this play, and which was enjoyed by everybody. (F.B., Hartford Gang).

It was agreed by all that this convention was the best ever held in New England and the thanks and appreciation of all delegates go to Messrs. Young, Kenyon, O'Connell and other members of the Providence Radio Association for making it such a success—and not forgetting all those loyal manufacturers and dealers, whose names appear on the programme, for the prizes contributed.

HARTFORD NEXT YEAR, fellows.

—A. A. H.

Strays

The Southern California Radio Association have formed a sorority addition which is called "The She-W Club." Next! The line forms on the right of the one with the marcel.

4DZ and 4AW have organized the "Palm Beach Radio Co." and have a station at Palm Beach with the call WOE. This will be interesting to brother A.R.R.L.ers in the commercial game at sea. They have a 500-cycle kit, but they can also use a 60-cycle "sink" for those who want to hear that old familiar roar. WOE is located on a pier 500 feet from the shore.

INTERNATIONAL Amateur Radio

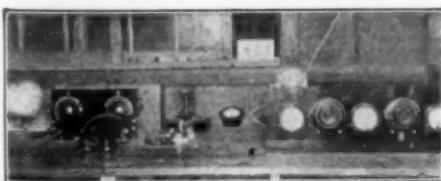
Amateur International Intermediates

A—Australia
 AU—Alaska*
 B—Belgium
 BE—Bermuda
 BZ—Brazil
 C—Canada and Newfoundland
 CH—Chile
 CR—Costa Rica
 D—Denmark
 E—Spain
 F—France
 FI—French Indo-China*
 G—Great Britain
 GI—Ireland*
 H—Helvetia (Switzerland)
 HU—Hawaiian Islands
 I—Italy
 IC—Iceland*
 J—Japan
 K—Germany
 L—Luxembourg
 LA—Norway*
 M—Mexico
 N—Netherlands
 O—South Africa
 P—Portugal
 PE—Palestine*
 Q—Cuba
 R—Argentina
 S—Scandinavia (Denmark, Finland, Sweden)
 SR—Republic of Salvador
 U—United States
 Y—Uruguay
 Z—New Zealand

*These intermediates have been self-assigned and are unofficial. They are in more or less general use, however.

A New One

On the morning of March 29th u6OI connected with a new station o (zero) 1SR at Salisbury, Rhodesia. Contact was held for



THE NEW 250-WATT TRANSMITTER AT 6OI

forty-five minutes, a message of greeting to the ARRL being transmitted. 1SR's wave was 31 meters. Following this initial

work 6OI and 1SR connected several times more, working "both ways around". F.B! 6OI has a new transmitter using a 250-watt tube. A photo of the new set is shown herewith. On April 2nd Borden of u1CMX and o1SR were QSO. Their QSO was also for about forty-five minutes although contact was broken up by QRN and QRM. o1SR's full QRA is J. W. Davidson, Box 580, Salisbury, Rhodesia.

Java

This boy Wentworth is hard to keep up with. As fast as he works a new station or a new country he comes back the next night and does a better job of the next one. The latest (up till time of going to press) is ANDIR the Military Airdome, Andir, Java. He and 6OI connected on the morning of April 2nd. ADIR was on 37 meters with 500-cycle note.

Crystal Controlled

u1CAK and g2SZ, both crystal-controlled, connected on April 12th for the first transatlantic two-way crystal controlled work. g2SZ was on a wavelength of 50 meters with D. C. supply and u1CAK was on 42.5, also with D. C. supply.

Australia

V1S and u9ZT connected recently. V1S is First Squadron, Australian Air Force, Point Cook, Victoria, Australia. It is expected that several other Air Force stations will be QSO on short waves soon.

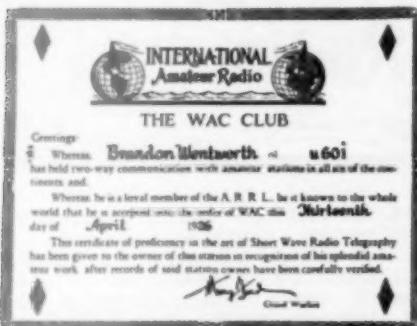
Austria

A number of S/W ham stations are in operation in Austria now. Their intermediate is the German O (—). The following are in operation: AF, AR, AW, BE, BH, CP, DA, FG, FH, FL, HF, HI, HR, JA, JL, KH, KK, LA, LM, LP, MH, NA, OA, OP, RF, RH, SF, SJ, SV, TA, TM, TO, TW, WA, WM. QSL's should be sent to Oesterreichischer Versuchs sendeversband, Klubsaal des Hotel de France, Schottenring 3, Wein 1, Austria. We are indebted to 8DTO for much of the above information.

The WAC Club

Have you applied for your WAC Club certificate yet? A photo of the first certificate

is shown herewith. The following stations have submitted applications and have been entered on the rolls of the WAC Club as full-fledged members: u6OI, u6HM, u1AAO,



THE FIRST WAC CLUB CERTIFICATE. YOURS IS WAITING HERE, OM

c4GT, pr4SA u9ZT-9XAX, b4YZ and g15NJ. The rules for applying for membership are few. You must have worked an amateur station in each of the six continents (see pg 54 of the May QST) and you must send QSL cards received from these stations to ARRL Headquarters addressed to the WAC Club. The cards will be returned promptly and if you have qualified for membership you will receive your certificate at the same time.

Chile

Major Raven Hart, ch9TC, one of the pioneer DX men in Chile has left that country and is now located in Barcelona, Spain. The Major says that a short wave receiver will be in operation in Spain very soon and he hopes he can get a transmitter going also. Good luck, OM es, CUL.

ch3AN (ex ch1GW) J. Gachelin will be in the States for several months and is anxious to meet as many of the U. S. gang as possible. He can be reached care Delco Light Company, at Dayton, Ohio.

The QRA of ch2RM-chC3AO is Rodolfo Mebus, Casilla 3208, Santiago, Chile. His QRH is around 37 meters and he is anxious to get QSO as many amateurs as possible. QSL cards addressed to the above address will receive prompt replies.

China

Several new contacts in China have been established. ch1TM, giving his QRA as Tangku, China (about 80 miles southeast of Peking) and 6OI connected recently. 1TM was on a wavelength of 37 meters and 6OI reported him R6. 8ATX worked a station hk3Z who gave his QRA as Colonel Warren, Pekong Street, Hongkong, China, on April 25. 3Z's QRH was 30.7 meters. He was using a 5-watt tube at the time and u8ATX was using a 250 watt.

Great Britain

Due to business pressure M. G. Dixon has resigned as Secretary of the British Section of the I.A.R.U. and F. A. Mayer has been appointed in his place.

g2KF in London and a2CM at Sydney, Australia were recently QSO via telephony. 2KF's signal were reproduced on a loud speaker at a2CM by means of a short wave superheterodyne. a2CM tried telephony to 2KF and while the signals were audible in England it was well nigh impossible to understand a2CM, so most of his work was done on telegraphy. g2OD at the same time established telephone contact with a2CM.

An error in call books is causing cards addressed to g5YI to wander all over England before reaching their destination. The QRA is A. L. Goodliffe, 17 Malvern Road, Mapperley, Nottingham, England.

Hawaii

Another very excellent piece of DX work has been pulled off, hu6CLJ Masayuki Misamoto, at Honolulu recently worked oA3B in Johannesburg, South Africa. hu6CLJ was using a 50-watt tube with an input of 39.5 watts, operating on a wavelength of 38 meters. The distance is around 14,000 miles. The sun was shining brightly in South Africa while 6CLJ was waiting to eat his supper! This boy 6CLJ deserves a lot of watching. He is going to make a lot of the DX hounds look to their laurels. With only 2.5 watts input to a 202 he has been QSO ch3IJ, about 6,000 miles away and with either a 202 or a 201-A he has been QSO several times with rDB2. With the 50-watt tube he and BAM in Papeete Tahiti have been exchanging chats several times. BAM by the way has the following QRA: George Cambridge, Papeete, Tahiti, French Ocean. The 50-watt transmitter at 6CLJ has also been used to work HVA in Indo-China. Hisamoto is a High School student, working after school as radio operator, receiving broadcast press news from JAA for the Nippu Jiji Publishing Company. We wish we had a photo of 6CLJ. Maybe we will have one before long.

A Request

Amateurs in foreign countries will confer a great favor upon the hams in the States, who are doing their best to operate in the correct manner, by paying no attention to the U. S. amateurs who are operating off their correct wavelengths. If you hear any "U's" out of their band *please disregard their calls.*

India

We understand there is a new ham station in operation in South India. The call is 2JL and the station is run by Captain R. J. Hobbs, 2nd Armoured Car Company, Ashley Park, Bangalore, South India.

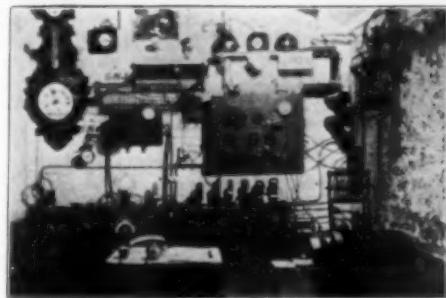
Please let us know as soon as you are QSO 2JL.

u6OI has had a schedule for some time with GEFT, *h.m.s. Concord*, on a regular run from Singapore to Southampton. They have been swapping QSO's ever since GEFT left Singapore. If you want to QSL communication with GEFT address him Petty Officer Telegraphist McTaggart, *h.m.s. Concord*, G.P.O., London.

Ireland

"Licenses for transmission were only granted in June 1925, but since that time Irish stations have been in communication with amateurs in all parts of the world. 5NJ has worked Australia, New Zealand, North and South America, South Africa, India, French Indo-China, Phillipines, Egypt and many other countries, besides putting good speech into a3BQ. 2IT is also QSO many parts of the world. 6YW has worked USA on 2 watts input, a record for Irish DX. 6MU is often QSO Australia, USA, Brazil and most of Europe. Other active stations are 6TB, 2WK, 6SQ, 6QD."—5NJ.

5NJ was the first licensed station in North Ireland. Maximum power is 100 watts. Both an 8-tube superhet and a two-tube



5NJ, THE FIRST LICENSED STATION IN NORTH IRELAND

regenerative receiver are used for short wave reception. The transmitter operates in a Hartley circuit working into a Hertz antenna.

Japan

Good of u6AJM-6CJP worked j3WW, Tabagawa, 4 Yamamoto St., Kobe, Japan, with a 210 tube. The actual input was 38 watts and j3WW reported him R5. 3WW's QRH was 38.6 meters at the time.

2AER has been copying commercial jjRA handling traffic with JJC on 35 meters.

hu6CLJ was QSO j1SK whose QRA is Shunichi Takata, Shimoshizu, Hikogakko Chiba, Japan.

Madeira

Madeira and Portugal use the same intermediate signal, P. The Madeira stations

have calls beginning with 3, while all the Portuguese calls start with a 1. Madeira is an island off the coast of Morocco. There are three active stations we know of there, p3GB, G. de Bianchi, Quina da Paz, Funchal, Madeira; p3CD, A.C. de Oliveira, c/o The Western Telegraph Co., Funchal, and p3FZ, J. Ferraz, Rue Ste. Maria 263, Funchal. 6OI in common with a number of East Coast U. S. and Canadian Stations has been QSO p3GB who seems to be the best DX getter of the 3 Maderia stations.

Mexico

We are pleased to show a photograph of m9A one of the most prominent ham stations in Mexico. The transmitter uses a single 203-A obtaining plate supply from four "S" tubes. The antenna is a single vertical wire 38 feet long. A single wire



M9A, ONE OF THE BEST MEXICAN DX GETTERS

counterpoise 30 feet long is used. The station operates regularly on 38 meters. A Reinartz receiver with one stage of audio frequency amplification and two BC Ultra-dyne receivers (not shown in the photo) comprise the receiving equipment. m9A has a splendid list of DX to his credit, although receiving conditions are usually pretty poor in his locality.

Morocco

A new station in Morocco was communicated with recently, and gents 1MK the A.R.R.L. Headquarters station was the fellow to work him! He is fm8MB, L. Bensimhon, Box 19, Case Blanca, Morocco. Rodimon was at the transmitting lever at 1MK when this communication was pulled off. fm8MB has previously been reported as being heard by u3CHG but we believe this is his first U. S. contact.

New Zealand

Via radio from 5ZAI we received the following news bulletin from z3AF: "The

Whaler *Sir James Clark Ross*, AQE, has left New Zealand regions QRD home, and by now should be in Europe. In a few months AQE will return again to the antarctic and no doubt will be glad to QSO hams in all parts of the world. Last winter did not seem to be very good for reception of American 40-meter signals, the summer (which is just ending) being much better as far as this part of the country is concerned. A month ago DX was good but lately fewer stations have been heard here. There is a new station open in this city this month. It is z3AC, The Radio Society of Christ church. A fifty watter with an input of 75 watts is being parked on the fifth harmonic of a big antenna. z3AC was QSO the States the first night of operation. The ops would like to have some 20-meter schedules with American stations. z3AF has worked German k18 three times and the QSO is good. k18 uses an input of 50 watts. z2AC has been working Portugal and other European countries and was recently QSO with SGC the motorship *San Francisco* in the Atlantic Ocean. He has also been QSO NRL in Russia on 35 meters. England is still being worked regularly, but very few Canadians are being listed."—z3AF.

9ZT sends us this dope from z2AC: "z2AC was first station in New Zealand to be QSO p3GB and Russian NRL. Also z2AC has a daily schedule with f8JN. f8JN's QRH is 33 meters and he can be heard every morning at 7 G.M.T. He is the loudest heard in nz and sometimes he is QRK R8! Some time ago z2AC was QSO fc8CM in China. His QRA is Elecmecani Factory, nr 544, Route de Zikawei, Shanghai, China. His QRH is about 35 meters, pure D. C."

Norway

The Norwegian amateurs have formed the NORSK Radioforbund, the central organization of all radio clubs in the country. It has about 35 members. QSL cards should be sent to Norsk Radioforbund, Oso, Norway. Transmitters are using 20 watts input on wavebands as follows: 2 to 5 meters; 29 to 35 meters; 69 to 81 meters and 100 to 120 meters. Both telegraphy and telephony are allowed in all bands. The intermediate is LA the calls being 1B, 1C etc.

Philippine Islands

Elser of pi3AA has just pulled off some splendid DX reception. He has worked g5HA when the latter was using an input of only 5.4 watts! On March 19th at 7 a. m. he overheard u9AX calling 8EO and then a CQ for several minutes. The distance between u9AX and pi3AA is about 14,600 miles! pi3AA has been in operation since January 20th. Twenty fours after the station was in operation communication was held with Brazilian stations. Very shortly after that Elser left for Manila and has

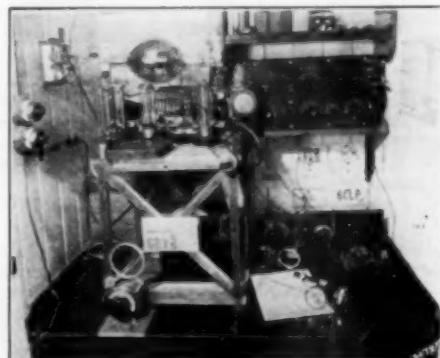
just gotten back to Baguio where 3AA is located. The transmitter at 3AA consists of two 50 watters in a coupled Hartley circuit. The usual operating wave is 38 meters. His power supply is obtained from a small hydroelectric plant and the 110-volt 60-cycle supply varies both up and down. Keep a watch for pi3AA from now on!

"I. A. R. U. Press"

A number of the fellows have been sending in IARU News Press Bulletins via radio. This is splendid. Not only are several months delay avoided but also the messages so handled are of the best type there are going through the air today. u5ZAI, u9ZT, u9XI, z2XA, z2AC, z3AF, a2YI and several others are to be commended highly for their great help. In this connection we would like to point out that there is no way on earth in which we can find the QRA of the many new stations in new countries that you fellows have had QSO's with unless you write us. The IARU News form closes on the 20th of each month. We would like to have a line of news from every country on the globe. If you cannot make it by radio, shoot it in through the mails. The news should contain data on new stations, new contacts between your country and other countries, any exceptional DX work, account of expeditions about to sail or under way, account of any exceptional traffic handling feats, dope on new laws and regulations in your country and *any* other ham dope which will be of interest to the rest of the ham world.

Ship to Land

The photo shown is an interior view of GDVB the motor liner *Aorangi* whose sig-



GDVB, THE FAMILIAR CALL OF THE
MS AORANGI
Photo by Signal Corps, U. S. Army

nals are familiar to all the hams on earth. A. E. Hay is the GDVB's chief operator and holds experimental amateur license g2KG.

The first assistant operator is g2KC. GDVB is the largest motor liner in the world (23,000 tons) and is commodore ship of the fleet of seventy vessels comprising the stock of the Union Ship Company of New Zealand. The *Aorangi* runs regularly between the Antipodes and the American continent via Honolulu. Much experimental work has been done on the ship on wavelengths between 22 and 49 meters with power inputs ranging from 50 watts to 3 K.W. After exhaustive tests it has been found that the best short wave signals have been pumped out when the long and high T ships antenna, having a fundamental of 435 meters, is used. The normal short wavelengths of GDVB are 36 and 38 meters. Ordinarily very bad induction trouble is caused when working the receiver as there are over 2,000 K.W. on board for electrical power purposes. GDVB is also very busy on 600 and the longer commercial wavelengths, which accounts for the fact that the short wave work is cut short at times. The operators will certainly appreciate any and all QSL's either of communications or receptions of GDVB's signals. They can be sent either to Sydney N.S.W. or Vancouver.

Volunteer Wanted for Standard Work

AVOLUNTEER station is wanted to send standard frequencies from some point in the central portion of the United States, distance north or south being a secondary consideration. The best location for such a station would be in the Midwest, Dakota or West Gulf divisions although the Rocky Mountain, Delta and Central divisions are not too far removed to be out of question. The requirements are somewhat as follows:

1—The transmitter should be controlled by an institution or individual widely and favorably known so as to inspire public confidence.

2—Accuracy better than 1/10 of 1% is necessary.

3—Ability to send standard frequency schedules one evening each week plus one schedule every third or fourth Sunday afternoon.

4—Ability to undertake the work for a considerable period of time, preferably in the summer as well as the winter.

5—Some sort of organization to insure that the schedules will be sent regularly; one man cannot do the job.

For further information see the various OWLS (SF) schedules of 1XM also the description of that station in this issue. The A.R.R.L. cannot furnish apparatus for this purpose but 1XM, thru the courtesy of

Dr. G. W. Pierce of Craft Laboratory at Harvard University will arrange for the calibration of a quartz crystal submitted by the prospective SF station. The accuracy of calibration will be better than the ability of the crystal to retain the same excepting under absolutely constant conditions.

Please communicate with K. V. R. Lanssing, in charge A.R.R.L. SF stations, 226 Elderwood Avenue, Pelham, New York.

—R. S. K.

Pacific Division, Southern Section, Hamfest

ONE of those jolly hamfests was again pulled off by the Southern Section, at the Elite Confectionery in Los Angeles on April 9th. With an attendance of seventy members present it really had the dignity of a real convention.

Director Babcock came over from Frisco and gave us a complete report of the annual board of directors meeting and explained the recent changes in the Communications Department and the reasons therefor. We now feel that better contact will exist between the ORS' and those interested in traffic, and Headquarters.

Mr. R. B. Ashbrook of the Southern California Edison Co., who is in charge of power-line-QRM-elimination, gave us a short talk in which he expressed the willingness of the company to co-operate to the fullest extent in clearing up such interference.

Miss Flora Turner, 6BXA, the only "YL" present, received a hearty welcome. It is always a pleasure to have the "YL's" at our meetings; their presence has a benign influence upon us. "May their tribe increase!"

Another visitor was Mr. B. T. Withers, z3AM, who told us of amateur radio conditions in New Zealand. Ben McGlashan, 6PI, also of KFWB, made the pleasing announcement about the Warner Studios' program, which is to be carried out under their auspices with the assistance of the A.R.R.L. Southern Section. More will be reported on this later.

At the conclusion of the Banquet, 6CNL rendered a few selections on his "uke," and 6CHZ played a \$25,000 (?) composition of his on the piano. After the "gang" heard that, they all went home, but not before L. Elden Smith, Section Manager, said that this was the most successful meeting held in some time, and it was a "loud speaking" evidence that we are all pulling together, and let's hope we will continue to do this.

—6CHZ—A.A.H.

June, 1926

Calls Heard



u1APV-1JR, Leach & McCarroll, Wrentham, Mass.
40-meter band

6awt 6bek 6bls 6bsc 6cgw 6cix 6cto 6cuw 6dah 6dat
6dax 6dbf 6dl 6fx 6gk 6hm 6hi 6jl 6oi 6qi 6rn 7ay
7bb 7tg 7no 7tg 7kg 7fea 7fca 7fdk 7fgi 7fgrs 7gjw
7f8xp 7f8or 7feng 7g2kl 7g2lx 7zod 7qob 7gvq 7gwj
7g2zx 7g6ls 7g6uq 7g6nq 7g6og 7g6td 7b4qq, 7b4ys 7bb2 7bd
7bt2 7by 7ilas 7ilay 7ilbw 7ller 7ller 7ilgw 7lrm 7lno 7bzlaa
7bzla 7bzla 7bzla 7bzla 7bzla 7bzla 7bzla 7bzla
7bz2ab 7bz5ab 7blr 7rbg 7rfb 7rfb 7rf54 7ch2d 7ch3ag
7ch3an 7ch3ij 7ch9te 7sao 7z2ac 7z2xa 7zad 7zaf 7z4aa 7z4ac
7zal 7zal 7z4xx 7a2ad 7a2bk 7a2tm 7ayi 7a3bd 7af3 7af5
7a3x0 7a3yx 7a5y 7a5bg 7om3b 7os4i 7os4z "on6n" 7car 7cz99x
7p2fs 7p3gb 7ear21 7ear22 7mlx 7mlj 7m9 7mk 7b19 7yld
7ycp 7y8 7k4v 7hu6bc 7ank 7bam 7ber 7nt 7sgc 7gt.

u1BFT-1CO, C. B. Evans, 80 N. State St.,
Concord, N. H.

a2cg 2cs 2tm 2yi 2yz 3ad 3bd 3ha 3kb 3xz 5bg b3ad
b2 beber ear 2rr 2ar4 fcng f8fb 8bx Sea 8dp 8gr
8ix 8gp 8sw 8ip 8sm 8ji 8pm 8ee 8oy 8uin 82k
2iw 2cc 2dg 2xy 2ma 2qm 2lx 2bd 2nb 2m 2g
5lb 5rz 5ls 5ls 6lj 6ld 6yd 6yu 6nj 6ry 6al ilno 1gw
1bw 1as 1zw 1bd 1ad 1bb 1ma 1ky 1y 19k m9a 1j
npb3 pcj1 pell 2pa 0s8b 4az 4abn 5pbk pr4je 4kt 4ri
4as 4ur 4q2le 2pk 6bb 8rg2 sard uxk xx bw 8ff 8x
v (naval) nsg npg nwd nar nise nism nisp nisar
napg ntts es mni others 24ac gdvb kfuh ch8te
(Commercial) wve wvy wvs kel fw byc bys afe kic
??7 dio agr oiaa ohaa vet utm jae cbpz ea. balab
Iac 1af lal 1aq 1aw 1lb 2ab 5aa 5ab. All crds qd'ld

**H. A. Chinn, 30 Coral Avenue,
Winthrop, Mass.**

gaaak gaaao gaaag gaat gadw gaafo gajj gajm
gakv gaamn sapi gaaap gank gauu gaaiv gavp gawt gaaap
gbad gbaav gbsc gbek gbgc gbbgv gbbhz gbbis gbbz gbbpg
gbq gbbq gbbf gbbtm gbbu gbbvg gbbvy gbaeo gbbj gbbz
gege gege gchx gchx gcepi gceqa geqt gcaas gers gcti
gcto gcaas gcpv gdaas gdaah gdaai gdam gdaaq gdat gdaat
gdf gaa gfa gfm ghs ghs gky gsr gbl gob grm gbs gwt gvv
gvt gsr gakr 7aif 7df 7ek 7it 7kg 7ki 7ny 7ps 7nq
7oy 7ru 7tm 7vh 7wu 7xf 7abk 7acn 7arj 7as 7aw
7atm 7ayi 7ayh 7asad 7abz 7abm 7ahl 7akb 7alm 7aboh
7atot 7aqh 7axo 7ax3 7atcm 7akn 7abay 7ad5 7abg 7an
7abu 7hl7 7pf 7bb2 7bj2 7bo 7bp7 7t2 7bu 7bw 7by
beber blabz balac balan blap balip blazp bb2ab bs4al
bsxni clan clex c2ac c2by c2eg c3ad c3el c3d0 c3e
c3he c3jjl c3yv c3ka c3xi c4bt c4fv c5go c5ar c5ld
c5hc c5okl d7ec ear2 car20 ear24 f8ax f8az f8bu f8ip
f8et f8dd f8dk f8dp f8ee f8gi f8gra f8hu f8jp f8jd
f8jf f8jn f8nn f8os f8pm f8st f8ex f8yd f8yor f8zc
foeng g2cc g2fm g2fv g2kf g2ks g2nb g2nn g2od
g2qb g2as g2wj g5at g6dh g6gv g5hs g5lf g5ls g6mh
g5mo g5pm g5as g5fl g5ah g5lk g5rm g6tb
g6tm g6yd g9ad hu6aff hu6bcue hu6bd llas ilad ilay
ilbw iler illp illo ilrm ilrp ilrt kls ky5 ky8 ky9
mlj mlk mln msc m9s mdh npcij npcuu n3gg npb7
oaa3b oaa4l oaa4v oaa4z oaa6n p3eo p3gb p3ob p3rf
pr4ur pilfn pilhg pifxl pilhr q2jt q2le q8kp rba
rc8b asdg amce amyyr sord xlad xlaa xlqf xlwa
z2ac z2bl z2xa z3af z3as z4ac z4ik z4al z4an
z4av ana age cpbz bam bdx kfuh jb jhm jow nem
ntt rxrd xda.

**u2AGL, Karl Rossbach, 620 Wyoming Avenue,
Elizabeth, N. J.**

4ax 4eu 4fl 4gy 4hu 4tx 4vl 5ac1 bacy 5aun бажу
5alz 5am 5an 5ao 5apу 5aqy 5arn 5att 5auz 5ce
5dq 5fe 5gq 5jd 5jw 5ke 5nq 5pa 5qh 5sp 5uw 5uk
6af 6afz 6apf 6asd 6bhk 6bl 6hq 6bvz 6cbp 6eez
6ei 6elz 6eml 6enn 6ewz 6ekz 6dqz 6ddz 6fz 6i 6iy

6uf Tab 7df 7ek 7gi 7ig 7ya 9aiz 9arr 9avr 9bhi, 9bjn,
9bac 9cgh 9clid 9cye 9ddie 9dwd 9eag 9ean 9eb 9egh
9egn 9fj 9gn 9gx 9kd 9nk 9xh clar c4hh c5go g2cc
g6ox ilad ilas.

u2GX, 40 Bread Street, Newark, N. J.

a2cm a2yi bt2 bw1 bw2 b4yz bs1ab bs1an bz2ab
bz5aa ch3ij d1ec ear2 ear6 earb ear9 earf f2aix
f2sw8 f8dd f8ek f8gi f8gx f8jd f8ja f8j5 f8oz
f8ww f8xp g2bs g2cc g2kw g2lz g2nb g2qb g2qm
g2rb glv1 g2vo g2xy g6at g6pm g6pb g6nf g6d g6y
h9ad ilac ilas ilay ilbd ilco ilgw iler ilrm ilrk
m9a on3b os3m oa4i oa4s oaen p3eo pg3b pebyx raas
sedk amzs z1ao z2ac z2gc z2xa z4ag

**u3VA, Fred Link, 40 S. Beaver St., York, Penna.
40 meter band**

a2an, a2cs, a2cx, a2bk, a2ij, a2mh, a2ss, a2tm,
a2yl, a2yz, a2yh, a2gq, a2rc, a2ns, a2lm, a2rm,
a2bg, a2yx, a3hl, a3xo a3jp a3wm a3bb a3ad a3tm
a3qa a3an a3bq a3bd a3lm a3yn a3ls a3ef a3bm a3kb
a4an a4rb a5da a5kn a5ay a6ag a5bg a7bq a7cs a7ew
a7gt a7hl bww b4rs b4yz beber c8ar c8wm ear9 car20
ch2ld ear21 ear22 f8cs, f8ca, f8jl, f8st f8rp8
f8jn g8i2 g2ce g2as g6f g6j g6t g6v g2z g6tm
g6uz g2qb g2kz g6ab g6al g6ym g2yq g6yu ilau
ilas ilbd ilbw ilma ilno iligw iler ilay kiy9
mlj mjh oa3b oa3e oa4l oa4v oa4z oa6n p3bk p3co
pilhr pi3as q2by q2lc r4fh s4ms z1ac z1ao z1ax
z1fm z1ed z1af z2ac z2ae z2bc z2c g2c z2d
z2x z2ad z2mb z2av z2xa z2gj z3ad z3ae z3af z3ai
z3ai z3aj z3id z3ac z3aa z4ac z4ar z4as z4am bzlab
bzlab bz1af bz1ap bz1aw bz1ag bz1al bz1ai bz1ad
bz1is bz2ab bz5ab kf3ju hu6sq hu6tq pr4ur pr4rl
pr1sa cdtw eddq e4gt hui7u nida sge.

**u4BL, The Bryant Twins, 315 W. Hillcrest Drive,
Lakeland, Florida
40-meter band**

a2bb a2bk a2cg a2cm a2cs a2dg a2dj a2ds a2gp
a2ij a2jm a2jw a2lk a2lm a2mh a2rc a2ss a2tm
a2yh a2yi a2yjx a3ad a3af a3aj a3bd a3bo a3de a3cf
a3hl a3kb a3lp a3ls a3m y3ot a3wt a3wm a3yn a3yx
a4an a4cm a4rb a5ay a4da a4kn a5lf a5rg a5rn
"a5kx" a6wi a7cs a7cw a7dx a7gt a7hi avls a8s
a29g b4rs b4yz b7p bw1 b2l beber bebes blab blabe
balal balam balan balap balar blawt btbd blibz
blila blilb blilc bz2ab bz2ad bz2af bz3ni c6go ch2ah
chear ch2ld ch3ij ch9te chvad ere ear9 ear20 ear21
ear22 ear23 f5bx f8cm f5ca f8dk f8dp f8ee f8en f8eu
f8gi f8gru f8je f8jif f8jn f8jw f8nn f8nx f8rp f8rn
f8tk f8xp f8yor fomn f8sqq fm8ma g2bs g2ec g2fm
g2fu g2lo g2kf g2ks g2lk g2nb g2nm g2ph g2st g2vq
g2wj g2xy g5an g6da g6de g6dh g6hs g6ls g6ma g6r
g6si g6as g6vl g6al g6iv g6js g6kk g6nf g6og g6x
g6rg g6su g6us g6yd g6yu hu6aff hu6buc hu6bd
hu6det hu6fl ilad ilaa ilay ilbw ilco iler ilfp ilow
ilmu illo ilrz k18 ilwj mij mif2enp nosp npeu oab1
olsr p2sl p3eo p3gb p3eo pe6ak pi8aa pi8ed piueq
pr4je q2pl rd2 rfb5 u7as y1eo y3eg y1ep z1an z1ho
z1ax z1f9 z2ac z2bc z2bd z2ga z2ge z2xa z2ne z2sf
z3ai z3aj z3an z3ac z3ac z3ak z3al z3am z4ar z4av
z4dbv z4rk z4kfuh. Mis. fw geft kf1t Morocco maro
pt3 pt5 pt3af (qra?) ?3db (qra?) ntt at Malta and
Cn'tnole.

u3RF, E. Petersen, 1 Cold Spring Avenue,
Baltimore, Md.

f8fr f8gl f8gk f8jf f8jte f8vor f8zo g6lb g6kk ilas
ilay ilbd ilgw ilno ilrm mjh mlj mlk m8st npb7
o3db oaen o3pa p4gb pr4ur q2jt q2le q5kp z4am ank
be fl ntt sge who ard.

u5KC, V. L. Rosso, Plaquemine, La.

u6BBV, J. Barsby, 1010 Bates, Hollywood, Calif.
40-meter band

labt laiu laad 1ga 1id 1ig 1uw 1vc 2aj 2bhq 2cqz
2kg 2nx 2qa 3mp 3wm 4fb 4lk 5gu 5aiu 5ako 5dq
5ef 5kk 5rg 5zu 7af 7de 7rc 7vr 7wb 7wy 7xz 7zm
8ed 8dx 8kw 8gb 8xe 9abu 9abt 9adn 9agv 9aqz
9bdq 9by 9bv 9bw 9bwo 9bcq 9cej 9egn 9che 9ckm
9ca 9ce 9du 9dxs 9ejb 9elt 9ff 9hb 9kd c4dq hu6buc
hu6cfd 1zfj 2zac 2zaf 2zbx 3af 3zs 3ac 4an 5da
24xa a2cg a2cm a2cs a2ds a2yi a2zn a3bd a4an a5da
a5kn a7ej ch2ld j1aa Tahiti bam pilhr nkf npu npp
wwp nppm agb.

**u7LQ-7I, W. C. Mock, Jr., 1200 Brazee St.,
Portland, Oregon
40-meter band**

a2ay a2bb a2bk a2cg a2cm a2cs a2dj a2ds a2ij
 a2jm a2jw a2kk a2lm a2rc a2tm a2yi an3s a3b3d
 a3bm a3hq a3ef a3hl a3kb a3lm a3lp a3tm a3xo
 a3xx a3yx a4an a4rb a5ah a5ay a5bg a5bm a5da
 a5lf a5rk a5rm a6ag a7cw a7gt a7pf z1aa xiao z1ax
 z1fq z2ac z2ae z2ak z2ap z2ga z2gr z2xa z2ac z3af
 z3aj z3an z3ac z3ak z3am z3ar z3av z3ix kuh
 hu6aff hu6ajl hu6bcu hu6clj hu6fxl hunpm huwyq
 pilan pilau pilbr pilew pi3aa picd8 pi3ja pi3ajad
 pineqq pinnb jila. China: glub. Borneo cecq. Java:
 ane anf. ch3ij. Straits Settlements: gecq ss2ae.
 bz2ab cz99x. Samoa: 6zac numm. oa3e oa4v ssnyy
 pow fw f18lt f18qq.

**u8AVO, A. G. Waack, 611 Madison Street,
Lansing, Michigan**

a2bd a2cm a2ds a2jm a2yi a3bd beber b2alz bz1ac
bz1ad bz1an bz1ar bz1in bz1ql bz2ab bz2ad bz2id
ilgw mla mlaa mlaf mlb mlx mbc m9a ncpjci
o3ab o3ae o4az o4en p4kt prje p4rl q2jt rbal
z1ao z1ax z1ac z4ar z4ki raa8 kfuh 6zac npu nism
nmt nkf.

**u8BKM, Wilbert C. Gross, 453 Mill Street
Conneaut, Ohio**
20, 40 and 80-meter bands.

Gaci Gada Gadt Gads Gahs Gaip Gais Gajm Gajp Gakm
 Galv Galx Ganw Gaoa Gnoa Gapk Gapw Gaqp Gasd Gasy
 Gbwo Gben Gbgo Gbgy Gbhg Gbhj Gbil Gbis Glbm Glbp Gbtv
 Gcbr Gchj Gchp Gcco Gces Gcgw Gchp Gckh Gcim Gciv
 Gdr Gck Gctd Geto Gctx Geuc Geup Gvav Geva Gevw
 Gedr Gdat Gduu Gdax Gdh Gdyd Geb Gbq Gfg Gfa
 Gfj Gha Ghj Ghv Gih Gkg Gnx Goe Goi Gpy Grf Gsz
 Gvr Gwd Gxg Gyb Gzci Gzjf Gzf Gzf Gyz Thy Tzy
 Tdf Tdm Ftm Ten Tefz Tfq Thy Tib 7jf Tk0 Tku
 Tmp Tmz Tno 7nl Tok Tor Tou Tox Tqu Trj Tzp Tab Tsc
 Tpu Tuj Tun 7tl Tvn Tvr Tvv Twj Tzw Twu Tww
 a2bg a2cs a2ij a2tm a2yi a3bd a3kb a3qh a3tm a3wn
 a3yx a5bg abkl bnsk b2bz bzzf bz2a b2aa bzcb
 bzcl2d bz3ag f8bx f8dk f8hu f8yor f8zo g2fm g2nn
 g2qm g6az hu6aff hu6bue hu6def hufx1 huwyq ilas
 mlaf mlb m5n m9a oa3b ot3b p3gb pr4je rh4
 zac x2aq x2ka x3ad x3af x4ac x4ar x4av gdvb jaf
 kfuh nari nba npl nqgl nqg2 smyy wvy 99x. All
 cards qd'.

u8CCQ. 311 Jerome Avenue, Williamsport, Penna.

ilay ilbd ilco ilgw ilno ilrm bzlab bzlac bzlaf
bzlaw bzian bzlln bzsqz bzab bzbab bzqgu bzunz
oazbz oazle oazs oazn oazr raf2 rhal rfsh4 hu6af
hu6bcu hu6def npb3 npb7 n2pz mig mlk m5c mba
mjh czok1 l smsz bb2 bj2 boz bwu bu3 b4yz p3co
p3gb kiz pr4bf v99z zlao zlax z2ac z2xa z2sf ziac
z4am a2bk a2cp a2cs a3by a3bd a3kb a3wm a3xo adan
a5da a5kn ch2ah ch2ld ch9tc ecar9 ecar20 ecar1
elan elak eldd eldq elidj eldm c2ax c4gt c5ef c5go
c8ar by wve wva sgc ntt rrp kpl kekg pkx pwa
nidk fts. All cards answered.

u8DCW, Saranac, Michigan
40-meter band

6aa^k 6aa^l 6adw 6ael 6aem 6afs 6aja 6aji 6aj^k
6akm 6akt 6akw 6alo 6alt 6ala 6amm 6anc 6anap
6anq 6ao^k 6api 6apk 6asd 6awt 6axe 6bac 6bad
6bdw 6bea 6bf^e 6bg^b 6bgo 6bha 6bhh 6bhr 6bhw
6bm 6bjl 6bmj 6bol 6bwo 6bpn 6br^c 6bry 6bc^d 6bt^e
6bts 6bvg 6bv^f 6bw^g 6bw^h 6cⁱ 6ca^j 6cc^k 6cc^l
6cd^m 6cdw 6cfⁿ 6cg^p 6ch^q 6cho 6chy 6cl^r 6clp^s
6cls 6cmq 6cp^t 6cp^u 6cp^v 6crz 6cs^w 6ctd 6ctk
6ctp^x 6cu^y 6cuw 6cu^z 6cv^a 6cvp 6dq^b 6di^c 6fa^d
6gh^e 6hv^f 6jn^g 6kd^h 6laⁱ 6np^j 6r^k 6rv^l 6rw^m
6urⁿ 6vr^o 6yb^p 6hd^q 6da^r 6dx^s 6de^t 6dg^u
6de^v 6ddo^w 6ddx^x 7ay^y 7df^z 7hb^a 7jx^b 7lq^c 7pk^d
7pu^e 7tw^f 7uz^g 7wu^h 7xfⁱ 7ye^j 7za^k 7adg^l 7ae^m
7akⁿ 7az^o 7ai^p 7a2m^q 7a2s^r 7a3w^s 7a3y^t 7a4n^u
7at^v 7bebam^w 7bzalaw^x 7balib^y 7bz5ab^z 7clam^a 7cldn^b
7cal^c 7c4ac^d 7al^e 7c4b^f 7c4cc^g 7c4dw^h 7c4dyⁱ 7c4en^j 7c4hf^k
7c5b^l 7c5f^m 7c5gⁿ 7ch2ld^o 7ch3lj^p 7f8hm^q 7f8jn^r 7f8kt^s 7g2nm^t
7g5f^u 7gyp^v (Scotland) 7hu6af^w 7hu6bc^x 7hu6cl^y 7hu6d^z
7hu6df^a 7hu6fl^b 7huwyq^c 7irt^d 7mlg^e 7mlj^f 7mln^g 7m5b^h
7m9aⁱ 7mjh^j 7o3b^k 7o4v^l 7o6n^m 7prfxⁿ 7pr4ur^o 7q2jt^p
7zao^q 7zlaw^r 7z2ac^s 7z2ae^t 7z2xa^u 7z3am^v 7z4ac^w 7z4av^x 7zkuh^y 7aq^z
7bg^a 7fw^b 7f8s^c 7gdvb^d 7kf1t^e 7mdo^f? 7nisx^g 7mp^h 7cellⁱ 7pjc^j 7pow^k
7pt1^l 7pt2^m 7pt5ⁿ 7gl^o 7vt^p 7ag^q 7vt^r 7am^s 7xds^t 7x7u^u.

u9CN-9CXC, Chicago, Ill

U.S.A.—6ak 6akm 6alt 6asd 6apk 6avj 6ahp 6ay
6bs 6bfy 6bl 6ber 6bd 6bgv 6bov 6bn 6bxz 6bw
6btv 6bv 6cv 6cpv 6ch 6cw 6cto 6cpf 6cs 6ca
6ers 6eur 6fr 6eej 6cl 6chy 6cp 6cl 6das 6da
6db 6dat 6dah 6do 6ea 6ew 6ha 6kb 6kv 6jq 6
6on 6rh 6rm 6ab 6uf 6vr 6vz 6ak 6yb 6ze 6ek
7akv 7alk 7ek 7gr 7hi 7im 7nf 7ok 7ps 7uz 7vn 7wo
7op r-644 rabl 6bzaf blab clar c4cs c4es c4dy
c4fy c4gt c4gt chleg ch2ld ch9tc erfa csx99s czaf
g2yb g6nn mlaa mlb mlk mlj m5c m9a mjh pr4k
pr4sa pr4oi q2jt q2rm sard sxsmmy wva yr5 z-kfub
npm npl npn npu nar npg nrt ntt nqg alaa a2cm
a2cs a2cs a2jr a2tm a2mh a3bd a2yx a3ad a3by
a3kb a3xo a3bg a3hr a3la a3ac a3zc a3ga a2gg
a2xa a3ca a3af a3ad a3ar a3rb a3al a3ac a3as a4ak.

u9DWG, J. A. Geissman, 185 Biddle Street,
Milwaukee, Wis.

6abg 6agk 6aij 6akm 6akx 6akz 6amm 6apq 6atv
6awt 6avj 6axl 6auu 6bau 6bgb 6bv 6bgy 6bhv
6bjx 6bjv 6bjd 6bkv 6bo 6bqu 6bn 6bmw 6brv
6bu 6bw 6cah 6cev 6cgv 6che 6clg 6cmq 6cpf 6csse
6cw 6cto 6cuu 6cqy 6dbj 6dab 6dag 6dbn 6dam
6dat 6dxz 6ew 6hw 6ja 6ml 6ox 6ts 6tr 6ur 6si
6ew 6wa 6xad 6xag 6xav 7abb 7ack 7af 7au 7di
7gb 7ek 7ls 7lu 7ok 7uk 7uz hu6af 7uhuc 7uhuf
clar 2cbg 3cs 4aa 4cgt chef c6go prfl priaa mlaas
mlg mik m9a m5c balab g2kf a2yi a4an a5bg a5kn
zlaa z2ac z3af z4ac z4am npg nrm nita ktfl (qra?)
nkf wqz wir wyy (qra?) nisr

**pr4KD, E. W. Mayer, USN Radio, San Juan,
Porto Rico
40-meter band**

ladi laja lasu latv lavw lay lbdg 1ber 1bhs 1bigs
 1blf 1cep 1eki 1epf 1ja 1kl 1mk 2aci 2aev 2alw
 2aqi 2arm 2awf 2bbb 2bfh 2bk 2blk 2bl 2bxw 2bxz
 2bj 2bl 2bu 2bw 2bxj 2byj 2cab 2cc 2ccj 2cdj
 2eft 1chk 2ckj 2cjj 2ctn 2euu 2ezn 2fo 2gi
 2mk 2ze 2os 2py 2uk 2xc 3bme 3bs 3gd 3hu 3sh 4dm
 4fk 4pk 4oy 4ps 5agn 5akn 5atz 5rz 5ap 5tp 5za
 6aij 6aqz 6t7d 7el 7abk 7alr 7apo 7avk 7pk 8hp
 8cmn 8dan 8df7 8dh 8gk 8jw 8kw 8ww 8zae 8apm
 9bi 9bjm 9bua 9bqa 9bqu 9bw 9ekm 9cpm 9evu
 9eg 9ny 9oy 9ox 9wi 9ta 9iba 9u3 9lalc 9lana
 9lala 9ldq 9lcl 9x3 9lc 9hga 95gm 9grk 9gnit
 9gyc 9fci 9sfb 9f8h 9f8z 9f8n 9f8ra 9k1v 9pb3

June, 1926

n2pz ilad ilay eear23 eear24 ssmuk ssmss naw nba
naj nosn nar1 wse kuhn kio keck age pow rgt.

**Harry Kidder, U.S.S. Blackhawk, c/o Postmaster,
Seattle, Washington
30 to 45 meters**

1aae lemp lcre 2ag 5af 5ain 5amw 5aqi 5atv
5aus 5he 5kn 5ms 5nw 5qw 5ed 5xava 5zai 5anfa
6aaag 6abg 6ado 6adt 6af 6ahp 6ajj 6ajl 6ajn
6akw 6axk 6bh 6an 6ano 6anr 6ase 6anu 6awt 6av
6bh 6bhz 6bh 6bil 6bjd 6bjx 6bq 6bqe 6btm 6buc
6cpg 6cuu 6cfc 6ewg 6chz 6clh 6ci 6cj 6clj 6cp 6cuo
6daj 6daa 6ox 6cn 6dn 6ea 6hm 6ji 6js 6kb 6kg
6kt 6la 6nx 6ob 6oi 6pn 6rj 6rp 6rw 6uc 6uc
6xi 6zac 7adm 7aku 7bb 7ek 7gr Tho 7lq 7tm 7ui
7vh 7wu 7sba 8xe 9do 9ar 9cby 9ek 9el 9et
9xi 9zf 9xf 9kfhu ngy nisu npg npi npn npn npn npn
nng2 nqt npum npug wh.

o38e on3e o3a 04a 04l 04a2 0a5z oab6 oab9
oab9r oab9p lwp p12 a2b 02c 02cm a2dp a2ds a2gh
a2jw a2lk a2rd a2rj a2ui a2yi a2yr a3ad a3ak a3bd
a3bi a3bm a3bp a3bq a3ef a3hi a3jp a3kh a3lm
a3gh a3ta a3tm a3wm a3xo a3yx a4at a4rb a4wi
a5ah a5bg a5bo a5da a5ho a5lf a6ag a6bo a6ci a7v
aviz bp2 b82 b2zb blazc blazf blazq blazr blazs
balza balia balqz bz2ab bz2ad bz2af bz2qa c4rt chleg
ch9te fc8em gfup andix ane pik phk g2fk g2lo g2z
g2nm g2od g2sz g2x gy65l g6sh g6nf g6to bye f8al
f8bf f8dk f8g2 f8hf f8j5 f8ki f8tk f8wg f8u mlaa
f8rqh hva x2bg 6i65n ilre iles j1aa jikk j1pp mlaa
z1aa z1aw z1ax z1fq z2ac z2aq z2ax z2bx z2is z2xa
z3ad z3af z4ac z4ng z4ak peldh pe6mg pe6yf pe6z
ear6 ear21 ss2ze anf bam crp 1z 6b 82e.

J. M. Miller, U.S.S. Seattle, Panama to Mexico

lac laep lajp lbes lbbm lbxg 1fv lga lid 1jl 1wd
2aec 2ae2 lahk 2ahm 2aim 2atc 2ec1 2gk 2ha 2kg 2ku
2no 2px 3bbh 2bwj 3by 3ec 3ck1 3ld 3lk 3mk 3mf 3wa
4aa8 4cj 4cu 4dk 4ft 4fl 4hv 4kn 4mn 4pf 4rd 4rm
4sa 4vg 5aab 5aac 5aa9 5aay 5ac1 5aey 5afg 5af6
5agu 5awg 5ahg 5aid 5an 5ajk 5akt 5amw 5apo
5aq 5aqf 5aqg 5aq7 5aqv 5arh 5atw 5azx 5awa 5awf
5dq 5eb 5ft 5hs 5jd 5jf 5oq 5yl 5sd 5uk 5wp 5ww
5za 5zai 5zo 5abg 5ad7 6af5 6ahp 6akx 6alt 6anc
6an9 6ao9 6aox 6apk 6asy 6auf 6awi 6awh 6bx9 6bjd
6bjl 6bjx 6bmw 6boh 6bt5 6bu 6bvq 6bv5 6ewg
6chx 6clx 6el7 6els 6emg 6emq 6enn 6euw 6evp 6daa
6edf 6dcg 6ec 6fa 6hv 6ml 6nx 6qu 6rd 6sb 6vr 6xav
7aa1 7ack 7am 7axc 7adz 7adz 7aks 7alr 7aly 7atx
Sal 7avj 7ba1 7bav 7bsc 7bw 7bz2 7ed 7egh 7evq 8ed
8dpj 8gz 8it 8jn 8kw 8pl 8xe 8xf 9abn 9adn 9adn 9az
9aef 9ael 9agl 9ajq 9at 9aoa 9asm 9aqz 9bay 9bas
9bbw 9be 9bht 9bn 9bm2 9bn8 9boz 9bz8 9bt4 9bun
9bv 9bhv 9bzv 9cex 9cgn 9cgn 9che 9ck 9ckm 9ek7
9cpm 9es 9ewf 9eyc 9ewz 9ezx 9dau 9dge 9drq 9dzg
9dt 9do 9do1 9dp1 9du9 9em1 9eel 9ent 9etn 9es 9ej1
9ek 9eli 9elt 9etj 9fi 9fu 9im 9np 9od 9wi 9xi 9xw.

c/o A. H. K. Russell, 6 Mail Bldg.,
Toronto, Ontario

c8ar c8wm bz2ab f8jw f8rbp f8yor g6lf ilbk mln
mik oa6n u6oi u6eby kegk kflt z2ac z3af z4ac.

**ch2LD-3AG, Luis M. Desmarest, Casilla 50D,
Santiago de Chile
40-Meter Band**

U.S.A.: 1aa0 1a1l 1aiu 1all, 1ar 1ban 1eh 1ekp
1emp 1ga 1rd 1uv 1ly 1yb 2azq 2ahm 2bw 2ejj
2bxl 3brw 3bu 3ec 3el 3chz 4aa4 4bh 4ca 4fl 4rm
4ru 4rz 4si 4v 5aab 5ac1 5adk 5ajz 5ak0 5aky
5al 5awm 5atp 5ahg 5agn 5atx 5ajj 5ev 5fc
5gj 5hy 5he 5jf 5ng 5og 5rg 5sd 5sp 5up 5xa 5xa2
5aa 5afg 5av 5axk 5anr 5apd 5apd 5ay 5axt 5atc
5apw 5ajm 5bbv 5bhk 5bjx 5by 5bwm 5bls 5bur
5bc, 5bcn 5ebk 5ewg 5elx 5elt 5euw 5evp 5evw 5eur
5ess 5eqt 5eu1 5eto 5eqa 5erp 5etp 5daa 5dag 5daa
5du 5dat 5dax 5dil 5eb 5ha 5hm 5f1 5ml 5kb 5oi
5ql 5js 5vmi 5vr 5xi 5yb 5df 5ab0 5aly 5bze 5bp1
5eau 5ekm 5em 5df 5djp 5gr 5gt 5stx 5xe 5adi 5ao1
5adk 5ado 5apn 5act 5bmd 5bxg 5bzi 5obs 5gbt
5bjn 5bjz 5ehe 5cip 5ewn 5evn 5en 5etg 5exx 5ibh
5e1 5dmz 5dud 5duc 5db 5duu 5eky 5ebi 5eli 5exx 5ibh

9eel 9fj 9jh 9kv 9nv 9pn 9wo 9xi 9za 9zt a2y
a4an clar c2bg c4gt c5go f8dk f8it f8jn f8xn hu6aff
hu6aj1 hu6bcu hu6dcf hu6tq hu6x1 ilgw j1aa
jlpp o3ab o3ac o4l o4m mlaa mlb mlj mbc m9a
o4n pilaa pilhr, Samoa 6zaa zlao z2ac z2ae z2aq
z2gr z2gx z2ja z2ab z2ad z4ac z5af z5ar wqz nqt.

J. and G. Bivort, 37 rue Elise
Brussels Belgium

f8SAX-8TBY, via Journals des 8, Rugles
(Eure) France
40-meter band

Iaso laci lada lain lair laiu lahb lajx lakz lapy
law laxa lqbb lbbm lbkx lpbx lbgx calk leh lck
lckp lclx lcmf lcmp ldi lef lgr lje lkk lkm
louf ldt lrr lsw lsr luw lwi lyb 2aez 2avz 2aqz
2aky 2bec 2beo 2bl 2brb 2bal 2bxj 2egi 2cji 2cmf
2enz 2cpd 2evj 2exl 2eyz 2fo 2mrz 2pp 2rv 2uk 2vf
2zb 3ab 3aha 3au 3auv 3bhv 3bwj 3edv 3dh 3hg
3jbj 3jo 3jw 3pf hen 4gw 4fm 5lo 4ok 4tv 4ut 4ux
5adu 5alb 5aly 5bgn 5ebi 5cr 5dn 5gz 5xe
clar c2ax c2be c2bg c2tx blab blac blablb blsln
bz2ba 5fl8t pr4je priaa y5bkb egeh narl not. All
cards qsl'd—Pee qrk my sigs?

**g2BQL, C. A. Richardson, 20 Craignish Ave.,
Norbury, England**
40-meter band

1bux 1cab 1cal 1cxz 1lmx 1mf 1np 1eo 1eoj 1ga
1aa0 1aff 1aiu 1ak 1are 1aur 1axn 1azd 1bhm 1bj
1hn 1ll 1kk 1mk 1my 1px 1sw 1sz 1yb 2aeu 2af
2ahm 2aky 2arw 2ate 2awv 2bbx 2bir 2ejj 2erb
2ef 2cyz 2gk 2gp 2ih 2kk 2mk 2mm 2nb 2ns 3ahl
3auv 3bvm 3cah 3dh 3dl 4ia 4rz 5atx 5fu 7we 8aj
8bdz 8dgo 8dm 8er 8jn 8xe 8xs 9adk 9ado 9anc 9bna
9dgz 9dxn 9ug 1ab2d 1ab2k 1ac2m (fone) 1ayl 1ab3d
1ab3k 1ab3kb 1amw 1a6c 1bi2al 1bi2al 1bi2ao 1bi2ar

bzlaw bzlaw bzlib bztab bz2ad bz2af bz2bi bzsqx
clak clar c8kp ch8ij ch9tc ycrp jiaa peybx
pe6kq pe6gm pilhr pr4je pr4rx pris4 rbal rdb2 rlp4
x2m (gra-7- slax z2ac x2y s2af zinc z4az z4wr s4xi
z5ai hm2cq hva hwg kvo kwo.

gi6YW, T. P. Allen, 19 Ardgreenan Drive,
Strandtown, Belfast, N. Ireland

Below 50 meters

labb labb labh lahl laiu lav lala laof laps lben 1bot
lbc 1cal leijj lcpmp lga lgr 1rd lrr lsw lxm lxx
2pcz 2ahm 2arm 2ate 2av 2brb 2cl 2cpd 2br2 2xi
2ev 2or 2uk 2xbp(?) 3brw 3bjq 3cab 2chq 3jw 3mv
3pf 4bl 4gf 4kf 4trx 4rs 4ss 4tf 4tv 4ur 6awt 8eqc
8dbb 8dg0 8ar 9dqu pilhr pineqq pi4na(. bl3aa
o4aa o6n b1zl b1zal b1zad b1zfal b1zal b1zal
b2lao b2lap b2lar b2lb b2lic b2zb b2aa b2z6a
b2ya sq1 b2nni ch3ij ch2ld ch9tc rdb2 a2bk a2cm
a2ds a2db a2bq a4rb a6ag clar c1dd c2ax y2bg f18sq
f18bt. Various gefk nkf not ntt nrk tuk rcr. Qrk
gifyw? All cards answered.

**Truxillo Railroad Co., Telegraph Department,
Puerto Castilla, Honduras.**

1aa0 1amd 1ar 1awe 1eo 1pl 2acp 2ahm 2b 2box
2mu 2nz 2xx 2xs 3aa1 4aa 4ac 4av 4cl 4fs
4ft 4fx 4jr 4ok 4tv 4xu 5aa5 5aaq 5cl 5ahp
5ain 5ahp 5ame 5apm 5fe 5ft 5gn 5ng 5ad 5bl 5abg
6bbi 6bh2 6bjd 6bqt 6cae 6ccs 6ew 6kb 6xi 6au
7nn 8ccs 8esr 8don 8gk 8jn 8xe 9aae 9ao7 9bbw
9bdh 9bey 9bjz 9bs1 9cm 9ent 9exc 9fbw 9ds 9ee
9ff 9im 9kg 9nm 9oo 9rt 9tbx 9lw 9ln 9lc
zero-2d pr4ss pr4je g2as s3jh plae h5kp agb agz
byz fw gbl ca kbb kdka lps nar nba nkf pkx ug ur
wyg wvb wve wvf wxy xam xda.

ch9TC, Los Andes, Chile

1aa0 1bec 1fs 2akb 2apv 2cns 2cxl 3ab 4ai 4rm
 4rs 5ain 5bmw 5aqg 5atx 5awf 5bd 5fc 5ms 5nz
 5hd 5ap 5xa 5aff 5afz 5av 5ajm 5apk 5axw 5xw
 6bam 6bfe 6bhz 6bil 6bjd 6btk 6bjl 6bjx 6bl 6bo1
 6bpq 6buc 6cvz 6cdw 6cia 6cja 6cqz 6cto
 6cu2 6cur 6dag 6dau 6dax 6dbg 6fa 6li 6mb
 6ml 6nz 6oi 6sv 6uf 7df 7en 7nf 8xe 9adk 9ado
 9ao7 9axx 9bk 9bmd 9eet 9che 9ek 9ctg 9ee 9kd
 9dqz 9dqu 9dur 9ebj 9nv 9oo 9pn 9abk 9ard 9bb
 9ao 9gbz 9gc2 9gnm 11as 11gw 11mj 11m9 11sa3
 11ao 12ak 12bx 12ai. Unknown age bam pt.

**HIER, Santangeli Mario, via S. Eufemia No. 19
Milan, Italy
New Calls**

lapy layl 1bad 1ben 1bmd 1efsi 1ch 1kj 1li 1lj 1wy
2aep 2aev 2aje 2alz 2atz 2ath 2auh 2av 2bum 2cwr
2cvi 2lm 2cu 2pc 2px 2acm 3anj 3bjq 3brw 3egs
3py 3tp 4aee 4bj 4bl 4fj 4ft 4kj 4pi 4rx 4si 5ac
5acl 5mak 5pk 5yb 6mu 7fw 7suq 8aqg 8al 8axl
8bcm 8bd 8bfn 8bkm 8bv 8bei 8eqv 8dbb 8doy 8eb
8ew 8fp 8lk 8ui 9bcz 9clz 9cyr 9ek 9lcg 9lij 9ef
a4an 9bla 9bla 9bla 9bla 9bla 9bsni 9cze 2apc
9clc 9ma 9ma 9pias 9pc8d 9rb2 9xae 9zaf 9ac. Miscel-
lanous: geft 3kp 9kw mt agt nmr.

SQ2 **Livio G. Moreira, Paula Gomes 6,**
Curytyba, Brazil

S2BN, S. Hislop, 8 Fitzroy Road, Napier, N. Z.

laep 1al 1buⁿ 1el 1ek 1uw 1yb 2abk 2aqg 2ahm
2amp 2ap 2bw 2cp 2xi 2xn 2me 2xa^c 3aqg 3bw^c
3cm^a 3ld 3lk 4bu 4rs 5ahg 5akl 5ds 5fe 5hy 5nw 5ga
5vm 5xau 5zai 6abg 6adw 6aed 6ajj 6aka 6akm 6alt
6aos 6apa 6arw 6avj 6bhz 6bil 6bos 6btz 6ewg 6ltc
6cm^a 6cm^b 6csx 6ctx 6cur 6cuw 6dar 6du 6dl 6fg
6hj 6hm 6hv 6if 6ji 6kl 6nw 6ob 6oi 6rl 6rm 6tl
6fu 6vo 7aa^j 7adm 7ay 7hb 7ho 7it 7no 7vq 8al^c

8bww 8ccb 8ded 8dri 8er 8gz 8nx 8pl 8xe 8zk 9aac
9afp 9aoon 9bn 9bcn 9bta 9bz1 9ct 9cfy 9fyp
9en 9eoou 9es 9ezj 9des 9dgz 9dkq 9dr 9duo 9ecl 9ej1
9eli 9ell 9fj 9flm 9kb 9kz 9luq 9qv 9wv 9zt Alaskan
7sm 8afsp 9ifm 8lne 8lsg 8f8g 8qv 8wv 8f8k 8f8q
hu6aff hu6fus hu6fus hu6fus ilan ilgw ilrm
ilmu mljj mje noas pilhr pi3aa age bam naaj yled.

J. da Rocha Saraiva, Lourenco Marques,
Portuguese East Africa

laci lah lair lain lAMD lan laof 1bgg 1bgi 1bsd
1bst 1by 1leak 1caw 1emp 1gx 1jx 1my 1ai 2bgg 2ain
2ain 2aky 2als 2amj 2aul 2bcz 2ee 2eft 2erb 2ds
2qw 2mk 2nu 2op 2um 2wh 2xt 3gq 3bmza 3bw
3de 3hg 3pb 2pf 3po 3pz 3wb 3xt 4aa 4ahh 4ac
4av 4cu 4dk 4eg 4er 4fr 4in 4iz 4je 4jk
4jn 4js 4nw 4pl 4pz 4se 4xe 5aa 5ac1 5adz
5al1 5am 5ap 5fc 5hi 5fj 5mi 5gs 5kd 5ee
5ux 5ai 5al 6ak 6ab1 6ae 6an 6ana 6ano 6aps
6agg 6ase 6at 6au 6arp 6bo 6bis 6bg 6blg 6bt
6cav 6cbk 6cbg 6cco 6chx 6ein 6cix 6enn 6cp1 6cq1
6eqw 6ct 6et 6ew 6db 6dag dam 6eb 6fe 6ha 6hu
6ih 6ji 6kg 6td 6oi 6ti 6tz 6ut 6sr.

Sada Sam Same Satv Savl Savo Sawa Sbau
Sbds Sben Sbf Shbd Sbg 8bf 8bt 8bwv 8cu 8cebr
8cqc 8eqo 8eyi 8daj 8dan 8dem 8dgs 8dfj 8dm 8dzg
8dw 8dzm 8eb 8edq 8eq 8kc 8mc 8nx 8si 8sj 8ul
8za 8zk 8zr 8aey 9aig 9ay 9aim 9aiy 9akf 9alf 9amd
9avj 9axx 9bt 9bme 9bmm 9bpb 9bu 9cen 9cl
9cip 9ctg 9evn 9eyi 9dot 9dp 9dpl 9dud 9ecc 9hp
9mx 9nv 9og 9oo 9po 9sw 9vo 9wo 9xi 9xh 9zd.
(20 meter band) 1el 1rd 2xi 6xg.

s2GA, J. Johnson, Brooklyn, Wellington, N. Z.

lein luis lemp 1aa0 1yb 1ani 2tp 2aes 2esi 5agn
5zai 5ui 5ay 5if 6esk 6ap 6bn 6bol 6buc 6alt 6eds
6sm 6bm 6eah 6chk 6bsa 6cxx 7aaay 7aeak 9uuq 9bmm
9rm 9xi 9ave 9xt 9hj 9dmz 9bsi 9uu pilhr ilno
hufxl hufasf hufdce hufage hufct hufyl g2z f8j
f8hf f8tk ch2rm ch9te balib bszni a2mh a2tm a2yi
a2yh a2eg a2rm a2cm a2gn a2os a2wo a2wm n2hk
a2ns a2lm a2vh a2da a2bn a2ij a3hl a3x0 a3ef a3ap
a3kb a2yp a3qh a3bd a3wm a3jk a3ad a3ag a3tm
a3ym a3cd a3an a4rb a5da a5ay a5kn a7dx a7dq
aoy kfuh wvc wpm bam vis fw nmp npu nequ

A.R.R.L. Information Service

Rules

1—Before writing, search your files of *QST*. You will probably find the answer there.

2—Do not ask for comparisons between advertised products.

3—Be reasonable in the number and kind of questions you ask.

4—Put questions in the following form:
A—A standard business size (not freak correspondence size) stamped, self-addressed envelope must be enclosed.

B—Write with typewriter or ink on one side of sheet only.

C—Make diagrams on separate sheet and fasten all sheets together.

D—Number each paragraph and put only one question in a paragraph.
E—Keep a copy of your letter and your

E—Keep a copy of your letter and your diagrams.

F—Put your name and address on each sheet. We cannot spend time digging your address out of the callbook.

Correspondence

The Publishers of QST assume no responsibility
for statements made herein by correspondence



Greeting to the High Schools

(The following radiogram from Honolulu has been received at Headquarters via 7AFO, R. G. Olson, Tacoma, Wash., originating at 6CLJ, the station of Masayuki Hismato, Honolulu. Incidentally, this is quite a message to come over that distance.—Ed.)

McKinley High School,
Honolulu, Hawaii.

Greetings to all mainland high school students via the American Radio Relay League, Inc., Hartford, Conn.:

On behalf of the two thousand students of McKinley High School, Honolulu, Hawaii, I send greetings to high schools in all parts of the United States.

We feel very near to you all, right now, in spite of the more than two thousand miles of water separating us from the mainland. In spite of our location and the great diversity of races, we are progressing in our student body. We are Americans both by birth and choice. The races represented in our student body are: Anglo-Saxon, Spanish, Portuguese, Japanese, Hawaiian, Chinese, Porto Rican, Korean and others.

Our high school has now four splendid new buildings, with an auditorium seating approximately two thousand students, to be built this year. Our courses and subjects are much the same as those taught all over the United States. Just now we are re-organizing our student body government. We take part in all kinds of athletics and support our teams with as much loyalty as that shown by any other high school. Our high school paper, the "Pinion," goes to all parts of the U. S.

We extend a warm Aloha to you all.

*Miles E. Cary,
Principal, McKinley High School.*

Sulphur Insulation

1311 Spring Road, N. W.
Washington, D. C.

Editor, QST:

Sulphur is a useful insulator for many purposes. It has its weak points, however. Sulphur exposed at summer temperature in a laboratory where mercury is present will acquire an invisible and conducting coating of a sulphide of mercury. This impairs the insulation. The coating can be removed

with sandpaper. This effect was called to the writers attention several years ago in a course on radium by Dr. Herman Schlundt of the University of Missouri. It is not difficult to melt and cast sulphur. This can be accomplished with little or no odor if care is taken. Use a large tube or deep vessel. Do not heat too hot. Sulphur melts and runs fairly freely, and then at a higher temperature becomes stiffer and turns dark temporarily. There is considerable shrinkage in sulphur castings, pipes or holes forming in the interior. By pouring carefully and following up the shrinkage by additions of more melted sulphur, a more solid piece may be secured.

Sulphur is a good insulator for electrostatic charges, as for instance in electroscopes. It was interesting to learn from QST that it also has small dielectric losses. Melted sulphur has been poured under the bases of heavy machinery to set and hold it. Sulphur, however, will crack under some kinds of mechanical shock. Experience with it in radio should be carefully noted.

—C. A. Briggs, 3CAB

A Good Suggestion

56 Humber Road.
Blackheath, S. E. 3.
London, England.

Editor, QST:

I have just finished an hours watch listening to you fellows in the U. S. A. calling CQ and CQ Europe. It appears that much of the trouble in getting QSO is due to the fact that we are uncertain what waveband you chaps are going over to listen on, with the result that we may be shooting perfectly good juice into the sky and you are listening many meters off our waves. The real trouble lies in the fact that whilst all you fellows are around about the same wavelength, the European amateurs vary widely, especially in the continent. Then there are the BZ's and others on your side, some above and some below your bands. I would put forward as a suggestion for the consideration of the hams that the wavelength or wavelengths on which you will listen be indicated during the CQ call, and a new QR signal be manufactured for this purpose. Thus: 'QRHH 30 45' would mean that when you finally get through CQing you will listen on the band between 30 and 45 meters.

The result, I am sure, would be more QSO's. For instance, on one occasion J

heard a BZ on 35 meters calling a U whom I had heard just before. The BZ goes over and gets no reply, and I heard that he didn't. On other occasions I have chanced calling him, wondering all the time whether this bird will be looking around at all, and if so whether on my wavelength, 45 meters. If I knew he would be listening around my wavelength I could call and be reasonably sure of a QSO. The above QRHH should be used only when calling or answering a CQ, and not otherwise. Hw, OM's?

—R. Bloxam, g5LS—

Rotten QSR

1476 Broadway,
New York City.

Editor, QST:

Sometime ago we decided that if we could get a shack on top of a prominent hotel we could accomplish a lot of DX and relay work. It was intended to use the shack as a station and also as a meeting place for hams. We put the proposition up to the management of the hotel. Their verdict was sure and exact. If we could prove the value of amateur radio in relaying some of the guest's messages to distant points then the hotel was ready to allow us to use their roof and even provide a shack for it. We solicited messages. We received messages for Germany, France, British Columbia and other DX points. Not having sufficient power ourselves we relayed them to 2FK whose records show they were sent on their way.

Days passed. We sent out tracers. More days went by. Still no answers. These messages are on the hook or in the wastebasket in some ham station, and are staying there. Our shack is no more a possibility. Amateur radio has received a serious setback in the eyes of over 300 B.C.L.'s who had begun to think that brass pounding was done by really serious thinking men. Evidently we can relay over pre-advertised, prearranged schedules at prearranged times but otherwise our efforts are wasted and we become mere tinkerers with our "Hws the note, OM?", "Wts my QRH, OM?" "Pse send card, OM" and other such stuff which we term doing relay work.

Something has to be done. This sort of stuff simply has to stop, or amateur radio will always be the nervewrecking muddle of mere nothing that it is now. Send out your messages within 48 hours and not 48 days. Then and only then will amateur radio be on the footing it was in the good old days long past.

—L. M. Horowitz, 2AIA

—K. A. Kopetsky, 2AIA

Better Multiplex Work

At Sea,

—ss West Jester, KUDG.

Editor, QST:

In connection with the article "Multiplex Reception" in March QST, the following might be of interest: Here aboard ship I am obliged to keep a fairly sharp watch on 600 meters while at sea, and at the same time I frequently want to copy long wave

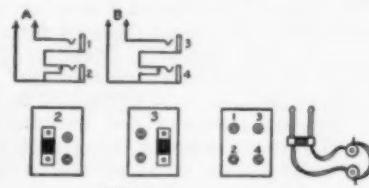


FIG. 1

press or short wave ham stuff. The duplex stunt was originally accomplished with a plug and jack transfer scheme as shown in Fig. 1. Four jacks were mounted at the corners of a square on a piece of bakelite, and two plugs were tied together so that they fitted the jacks, either across or up and down. With the double plug in position 1 a separate phone is connected to each receiver. Turning the plugs upside down in the same pair of jacks "change ears". In position 2 both phones are in series on receiver A only, and in position 3 both receivers are in series on receiver B.

Later on I substituted two 4 pole double throw anti-capacity switches for the plug

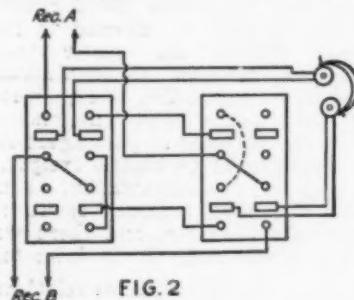


FIG. 2

and jack arrangement. The hookup is shown in Fig. 2. With both switches up both phones are in series on receiver A, while when both switches are down the two phones are in series on receiver B. With the left switch up and the right one down the duplex arrangement with one phone on each receiver is secured. Remember that the switch handles move in a direction opposite to the blades on the anti-capacity switches, though.

—L. O. Doran, KUDG

P. R. R.

Operating Department,
Pennsylvania Railroad System,
Philadelphia, Penna.

Mr. Hiram P. Maxim,
American Radio Relay League,
Hartford, Conn.

Dear Sir:—

The period of the A.R.R.L. emergency service for which we arranged with you is over for this season. Fortunately there were no emergencies which developed during this time that made it necessary to call on the League members for assistance, but from the tone of some of the correspondence, it is evident that some of the enthusiasts would have enjoyed handling some real messages just to prove that they were equal to the occasion; and we believe that they could have done it from the results of the tests toward the latter part of the period.

The League organization and the members who participated in these tests, also those who stood by in readiness to bridge a gap or handle such messages as might be assigned to them, are to be commended for the excellent results in handling the test messages, and for their loyalty in standing by the League, doubtless sacrificing their own pleasure for the sake of carrying on.

This service is in the nature of insurance against interruptions to our communication system caused by severe storm conditions which usually may be expected to hit us somewhere during the winter months. Prompt and accurate communication is essential in transportation work, especially during emergencies when assistance is necessary for the relief of passengers or the prompt handling of perishable freight, etc. This kind of communication, handled promptly and with accuracy is what the tests were intended for, and there was a noticeable improvement in the later tests.

It is hoped that the pleasant relations established through the medium of this emergency work will have proved beneficial from every standpoint and that they may continue in the future, also that arrangements may be made this fall for a resumption of these activities.

With kind personal regards and best wishes to you and all the members of your organization who participated in any way in this emergency work.

—J. J. Johnson,
General Superintendent Telegraph.

Shut In?—Not with a S. W. Set

208 N. Jackson Ave.,
Kansas City, Mo.

Editor, QST:

For three or four months I have been one of the many who have been causing QRM on 40 meters. I am what is generally known as a "shut-in", but I do not feel shut-in any more. I have to lay flat on my back all of the time, and can use only my left arm. Last November 9ADR made and installed a 5-watter transmitter for me. He also made a change-over switch to be operated by means of two strings. He put a six foot extension cord on the key and put a switch in the primary of the power transformer. I can work the set very easily and I can usually get back on the air as quickly as the other fellow, 9BMP gave me the tube for my transmitter and 8EQ made my receiver.

The first station I worked was 5ATX and when I heard him calling me I got so excited I didn't get a single word he was sending. I asked him to repeat and he did, but I didn't do any better the second time. 6BQ was the second station I worked. Since then I have worked many stations. I usually operate in the morning or in the afternoon and find no trouble in connecting with a lot of fellows who will "chew the rag" with me.

9ADR is the call of Ray Scrivener. He is a regular "ray of sunshine", too. Whenever anything goes wrong with the transmitter or receiver he always comes over and fixes me up. You hams are a mighty fine bunch of fellows and I am mighty proud to join your ranks.

—Max J. Colvin, 9WV

An Italian Contest

Viale Maino 9,
Milan, Italy.

Editor, QST:

The National Radio Club of Italy has organized a contest for Italian hams. This contest will occupy the period of April 1st to December 31st 1926. A prize is to be awarded for each of the following accomplishments: (1) Greatest distance for communication on wavelengths below 5 meters; (2) Greatest distance obtained in 10 radio-telephonic communications; (3) Shortest wavelength produced and received in a radius of 200 km.; (4) Greatest number of two way communications with stations over 5000 Km. away. In all cases the power input must not exceed 200 watts.

All foreign amateurs are kindly requested to send their QSL directly to the amateurs in the contest or to Ernesto Montu Sec'y General, R.C.N.I., Viale Majno 9, Milan, Italy. We would especially draw the at-

tention of the foreign amateurs to the fact that QSL to the *radiotelephonic* transmissions will only count when the speech was received perfectly clear and was perfectly comprehensible. The QSL card should be so worded that this will be apparent.

—Ernesto Montu, i1RG

The Tone Meter

20 Duryea St.,
Springfield, Mass.

Editor, *QST*:

With reference to my article in the January issue of *QST*, "The Tone Meter", the following has been called to my attention. With the rectifier and filter system on no load, the tone meter should read zero. This is because the filter condensers build up to the peak rectified voltage value and the voltage remains constant there. However, if the meter does give a reading, it is an indication of leakage current, either back-current through the rectifier or leakage through the filter condensers. Therefore if the meter reads other than zero on no load, a very bad condition exists as leakage or back-current tends to destroy filtering action. A small back current with chemical rectification has to be tolerated.

Perhaps this information will be helpful to readers of *QST*.

—L. J. Wolf, 9DKT

NOTE

The cuts reproduced below were omitted from Mr. Tannat's letter which we printed in this Department last month.

Strip for upper window frame to rest on.



FIG. 1

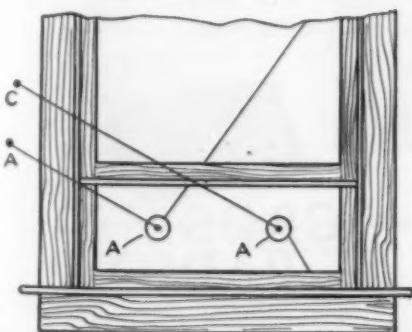


FIG. 2

SAY YOU SAW IT IN QST—IT IDENTIFIES YOU AND HELPS QST



YES SIR, ERETIA, WHEN I CALLED BABYLONIAN
ZAE ON MY UV.199 HE CAME RIGHT BACK AT ME.

FILAMENT AND
PLATE TUBES

Famous BH Transformers Transmitting Transformers

We manufacture a complete line. Our transformers are ideal for low wave transmission.
Write for Our Catalogue
Benjamin Hughes Electric Company
298 La Gauchetiere St. W., Montreal, Can.
Transformer Builders Since 1910

BECOME A RADIO EXPERT

IN 3 MONTHS Our unique Radio-EE Course in practical radio engineering makes you an expert in the fascinating study of world's greatest science.

STUDY AT HOME You can learn at your own pace, in full comfort and privacy, on the plan described. Full equipment furnished free, including Supplies. Tell us what you want to learn and we'll teach you how to do it.

From the start... LEARN HOW TO GET THIS COURSE FREE! Our unique Radio-EE Course in practical radio engineering makes you an expert in the fascinating study of world's greatest science.

Whether you know radio now or not, we can teach you how to become a radio engineer. You can learn at your own pace, in full comfort and privacy, on the plan described and get a diploma as a radio engineer. Thousands of positions are available to radio engineers. Tell us what you want to learn and we'll teach you how to do it.

If you make good, Get our book, "Millions Untouched". It is free.

Write us today and learn how to make \$10 to \$100 a week. I. J. Morris.

AMERICAN RADIO ENGINEER'S, Dept. 213, Hurst Sq., Chicago, U.S.A.

The ADVANCE "SYNC" RECTIFIER

is preferred by amateurs all over the world

1. The ADVANCE Sync Rectifier actually does what any other rectifier claims to do.
2. Can be easily and quickly filtered.
3. Meets all requirements for heaviest duty.
4. Speedy starting because of Advance Bakelite wheel.

5. Requires no attention—always ready.

Its prevailing use in international transmitting is evidence that, although lower in price, the advance Sync Rectifier is superior in quality.

Revolving disk is moulded bakelite six inches in diameter. Nickel plated brush holders with adjustable gauze copper brushes.

Convenient control handle. Disk, aluminum brush arm support and brush holders perfectly insulated.

Price complete with Westinghouse 1/4 H. P. Synchronous Motor ... \$40 Rectifying wheel with complete brush assembly and mounting ring to fit your own motor ... \$15

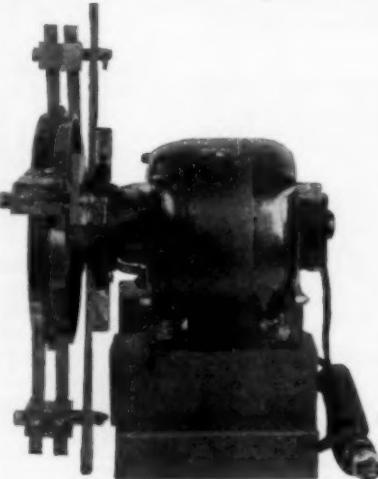
We Pay All Transportation Charges in U. S. A.
ADVANCE ELECTRIC COMPANY
1260-1262 West Second St., Los Angeles, Calif.

THE SUPER-SYNC

The Synchronous Rectifier That Can Be Filtered

The Super Sync is the only synchronous rectifier that can be filtered using ordinary type of filter circuit. Tests prove that the Super will stand up under constant use without giving the least trouble. The only attention required is an occasional oiling of the motor bearings.

The Super is rated at 4000 volts 250 M. A. This



PAT. PENDING
PRICE \$75.00 F. O. B. ST. LOUIS

MARLO ELECTRIC CO., 5241 Botanical Ave., St. Louis, Mo.

is usually sufficient to supply the average amateur transmitter.

The commutator on the Super is eight inches in diameter and is turned at a synchronous speed by a $\frac{1}{4}$ H. P. Synchronous Motor. This motor can be supplied for either 110 or 220 Volts 50 or 60 Cy.

BREMER-TULLY

will soon offer



Type UL Socket 75c.
Takes both old and
new type base tubes.

A New Non-Microphonic Tube Socket

The new B-T socket is a further development of the B-T Silent Socket which many fans welcome as the best remedy for microphonic tube noises.

Look for further announcements on B-T.

B Battery Eliminators Complete
B " " Parts

New models of factory-built receivers.

Circulars ready about July 1st.

Bremer-Tully Mfg. Co.
532 So. Canal St. Chicago, Ill.



Powel Crosley, Jr.,
has developed in the
CRESCENDON
a device that gives
this

4 TUBE RADIO
performance **\$29**
expected in sets of much greater cost

4-29



CROSLEY
RADIO

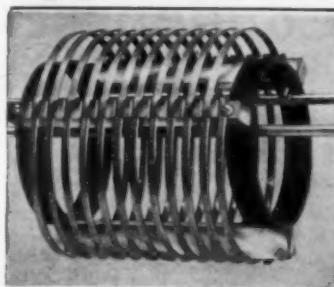
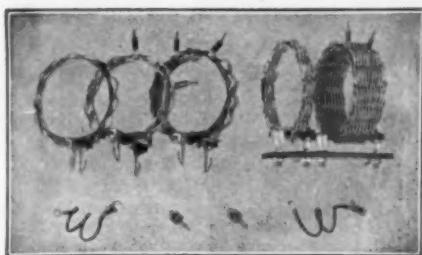
Write Dept. 18 for Booklet
THE CROSLEY RADIO CORP.
CINCINNATI, OHIO

Prices slightly higher west of the Rockies.
Dealers sell Crosley Radios from
\$9.75 to \$75. and the Musicone
Loudspeaker at \$14.75

SAY YOU SAW IT IN QST—IT IDENTIFIES YOU AND HELPS QST

REL**REL**

Short-Wave Apparatus



The Very Best in Receiving and Transmitting Inductances

RECEIVING

Basket-wound with heavy triple-cotton-covered paraffined wire.

Electrically efficient and mechanically rugged.

Each coil rigidly secured to Radion strip on which nickelized bronze plugs are mounted.

Adapted to any circuit. Complete set of five coils and mounting strip has wave-length range of 12 to 120 meters with 100 μfd . condenser. Price, complete set, \$4.50.

Calibration—Each coil of each wavemeter is separately calibrated. This means that each instrument is accurate. A wavemeter that is not accurate is a very useless piece of apparatus.

Calibration Curve—Three curves drawn in different colors give the readings for the three coils. The chart is neatly covered with a transparent material and bound with black tape. This makes it dirt-proof.

The wavelength ranges of the coils are:

- Coil No. 1—
Black Curve,
20 to 80 meters.
- Coil No. 2—
Red Curve,
74 to 200 meters.
- Coil No. 3—
Green Curve,
200 to 550 meters.

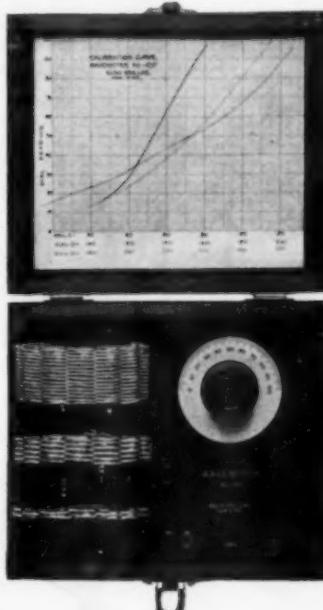
TRANSMITTING

Unquestionably the finest short-wave transmitting inductance on the market.

Flatwise-wound nickel-plated copper strip on moulded glass separators.

Made in two sizes; type L, 5 inches diameter, for 40-, 80- and 150-meter bands and type S, 2 $\frac{3}{4}$ " diameter, for 20-meter band and lower.

Price, single unit with three clips, \$5.50; double unit (pri. and sec.) with glass coupling rods and six clips, \$11.00.



The REL Type "A" Wavemeter will be found satisfactory for all general purposes. It has a range of 20 to 550 meters with an accuracy within 1%. The design of the inductance and capacity is such that the high frequency resistance is as low as possible, so that the losses in the wavemeter circuit are small. By thus keeping these losses small the Wavemeter is more sensitive, the sharper its tuning to resonance and the lower its decrement.

The Coils are of "basket weave" design with heavy brown triple cotton covered paraffined wire. Each coil is specially treated after winding and then permanently mounted on an insulating strip which holds the mounting plugs. The coils are easily interchangeable by means of the REL Plug-In Method.

Type "A" Wavemeter With Neon Tube Indicator
Price Complete With Calibration Curve \$22.00

Radio Engineering Laboratories
27 Thames St., New York, N. Y.

REL**REL**

SANGAMO

Mica Condensers in intermediate sizes



IMPROVE
TONE
RANGE
AND
VOLUME

IT is accuracy, not luck, that makes one receiver sweeter and more powerful than another that is almost its twin. Especially condenser accuracy, for the closer you come to absolute accuracy at these critical parts, the more wonderful your receiver will be. The cost of accurate condensers is small — the effect is immense.

Now you can get Sangamo Mica Condensers in capacities in between the usual stock sizes so you can build with greater accuracy than ever before. They are guaranteed to be accurate, and they always stay accurate, being solidly molded in bakelite. Neither heat, cold, moisture, pressure nor acid fumes will affect their capacity, because bakelite seals the delicate parts against all outside influences.

Capacities in microfarads and prices

0.00004	0.001
0.00005	0.0012
0.00006	0.0015
0.00007	0.00175
0.00008	0.002
0.0001	0.0025
0.00012	0.003
0.00015	0.0035
0.000175	0.004
0.0002	40c.
0.00025	0.005
0.0003	70c.
0.00035	0.006
0.0004	85c.
0.0005	0.007
0.0006	90c.
0.0007	0.0075
0.0008	95c.
	1.15
	\$1.00
	1.20
	1.25

With Resistor clips, 10c. extra

Also Sangamo By-Pass Condensers

1/10 mfd.	80c.	1/2 mfd.	90c.
1/4 mfd.	80c.	1 mfd.	\$1.25

Sangamo Electric Company
Springfield, Illinois

RADIO DIVISION, 50 Church Street, New York

SALES OFFICES—PRINCIPAL CITIES
For Canada—Sangamo Electric Co. of Canada, Ltd., Toronto.
For Europe—British Sangamo Co., Ponders End, Middlesex, Eng.
For Far East—Ashida Engineering Co., Osaka, Japan



This is the new
TOBE MS IV — 8
Watt Transmitting
Tube.

OPERATING DATA

Filament volts—6.

Filament current—2

amps.

Maximum plate volts—

800.

Plate current—40 M.A.

1. This tube is characterized by extreme hardness.

2. Careful and rugged internal construction.

3. Bakelite base.

Unexcelled for technical precision and durability.

Price—\$6.00

At your dealers, or
send check or money
order to

The Tobe - Mueller
transmitting tubes
were used in the tests
at Mass. Inst. of
Tech. described in
this issue.

Tobe Deutschmann Co.
Cornhill, Boston, Mass.

We sell transmitting-condensers, too.
Send for literature.

V.T.14 Transmitting Tubes

Rated at 5 Watts



(MF'D BY GENERAL ELECTRIC CO.)
NEW, IN ORIGINAL CARTONS

Filament voltage 7½ Volts.
Filament current 1¾ amps.
Normal Plate voltage 350 Volts.
Plate current 40 milli-amps.

Also Used as Power Amplifying Tube
STANDARD BASE

PRICE ONLY \$1.50 EA

American Sales Co.,
21 Warren St., N. Y. C.

Laboratory Product

**CRESCENT
LAVITE
RESISTANCES**

for Distortionless Amplification.

TRANSMITTING GRID LEAKS

Use Crescent Lavite resistances,
noiseless, compact, non-inductive. Each
unit will dissipate 4 watts, parallel for higher wattage.
5000 Ohm grid leak as specified by JOHN M. CLAY-
TON \$2.50 each.

Dual Resistance for DeForest "H" Tube \$3.50

Dual resistance consists of two units mounted on
bakelite and connected in parallel.

Please specify if your "H" tube requires 60,000 ohms
or 20,000 ohms.

All amateur apparatus in stock. Let us drill and
engrave your panels.

CRESCENT RADIO SUPPLY CO. 1 Liberty St., Jamaica, N. Y.

Startling— Two New Products by “General Instrument”



G. I. VARIABLE AUDIO TRANSFORMER

For the first time—a transformer that really matches the characteristics of the tube. For use in any set—in detector circuit and any or all stages of amplification. Easily adjustable—merely turn the knob until reception is clearest and sharpest. No squeals, no howls; just perfect reproduction.

Write for complete literature on all G. I. Products

**General Instrument
Corporation**

Manufacturers of Laboratory Equipment

477 Broadway New York City

G. I. SHIELDED UNITS

Are single stage T. R. F. Amplifiers which can be used interchangeably as detector or amplifier—increasing the selectivity and sensitivity of any set.

Can Be Used—

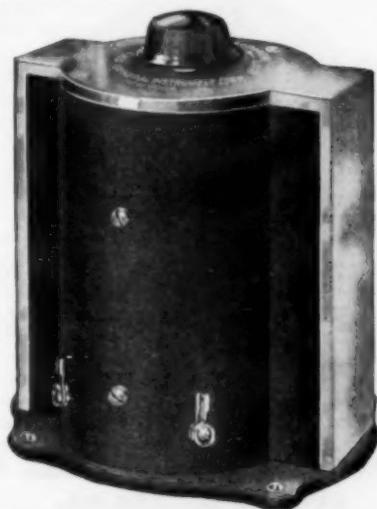
As complete sets using from 1 to 8 tubes

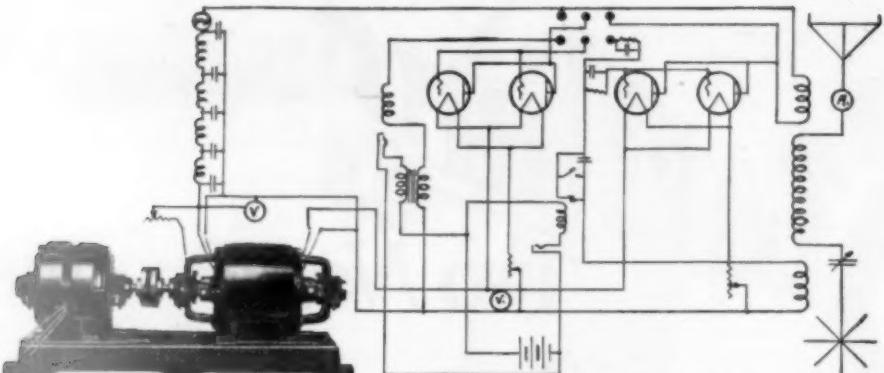
To replace old tuning units

To add R.F. Amplification to any set.

G. I. Shielded Units cover the entire Broadcast band with absolute stability and increase amplification.

Each unit a complete receiver in itself—with dial, UX socket and S.F.L. condenser in a mahogany crystallized aluminum “can”.





Item 37 2 unit four bearing set, delivering 1000 volts, 600 watts for plate and 12 volts, 300 watts for filament. The "ESCO" Set is shown here furnishing Power Supply for 4—50 watters in a phone or telegraph set. This is the Item used by CB8 in pioneer achievement of the first two way amateur wireless communication between North and South America.

ELECTRIC SPECIALTY COMPANY

Manufacturers of Motors, Generators, Motor-Generator Sets, Dynamotors and Rotary Converters for all radio purposes. Have you got your copy of Bulletin 237B and ESCO Filter facts? If not write for them.

TRADE "ESCO" MARK

225 South Street

Stamford, Conn., U. S. A.

"ESCO" Engineers will help you solve that Generator problem

HOYT

Switchboard Meters



HOYT has made Precision Switchboard Meters since 1904, in all sizes, from 3" to 8" case diameter, both for A.C. and D.C. They all have hand-calibrated scales and are recommended for all transmitting station and amateur uses.

A new catalogue on HOYT Switchboard Meters is ready for distribution and will be gladly sent you free on your request.

BURTON-ROGERS CO.
26 Brighton Ave.
Boston, Mass.
National Distributors

CARTER

"HI-OHM" Universal Volume Control

For All Circuits



(PAT. PEND.)

500,000
OHMS

\$2

HALF SIZE

A non-inductive, variable, wire wound resistance 1 1/2" dia. Projects 5/8" back of panel. The contact arm slides on protecting wires covering the special moisture proof resistance element, eliminating wear and assuring long life and unvarying electrical characteristics.

"HI-POT" same size with third terminal, \$2.25. Write for illustrated folder of full description and circuit diagrams.

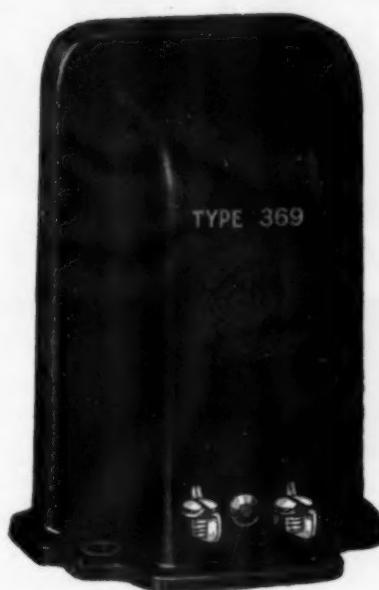
R.M.A. Any dealer can supply

In Canada — Carter Radio Co., Limited, Toronto

Carter Radio Co.
300 S. FAIRING AVENUE
CHICAGO, ILL. U.S.A.

For Experimenters who prefer Impedance Coupled Amplification

Type 369
Coupling
Impedance



Price
\$5.00



The General Radio Company has endeavored to make it possible for the experimenter to obtain its products with a minimum of effort. A careful selection of distributors and dealers has been made. They are best fitted to serve you. If, however, you are unable to obtain our products in your particular locality they will be delivered to you, postpaid, direct from the factory upon receipt of list price.

In search for a perfect amplifier experimenters are now giving much attention to coupling impedances.

While transformer coupled amplification produces more amplification per stage than any other method under some conditions slightly better quality may be obtained by the use of impedances and resistances.

By using chokes of sufficiently high inductance, a quality of reproduction may be obtained equivalent to that produced by resistances.

The use of chokes has the added advantage of requiring considerable less plate voltage thus reducing operating costs of the set, and also giving greater amplification per stage.

A three stage amplifier using three General Radio Type 369 coupling impedances will give a combination of generous volume with exceptional purity of tone.

Write for our circular showing wiring diagram for a 3 Stage Impedance Coupled Amplifier and our latest parts catalog 924-A.

GENERAL RADIO CO., Cambridge, Mass.

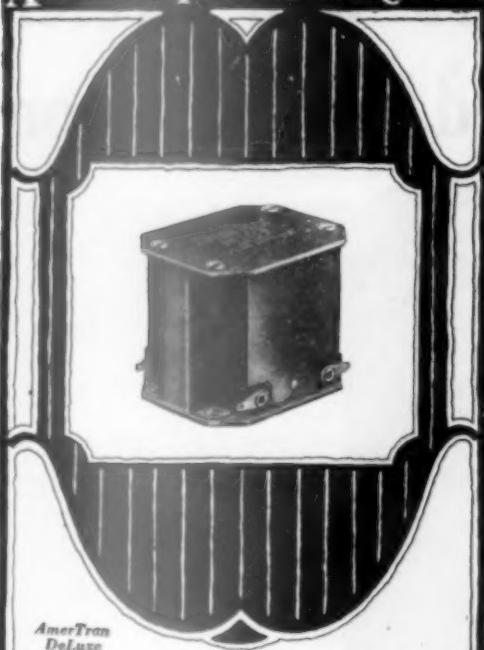
GENERAL RADIO

INSTRUMENTS

Behind the Panels of Better Built Sets

SAY YOU SAW IT IN QST—IT IDENTIFIES YOU AND HELPS QST

American Transformer Company



*AmerTran
DeLuxe*

A reputation for fine transformers a quarter-century old! Today this high standard is more apparent than ever—for Radio recognizes AmerTran products as dependable leaders.

The new AmerTran DeLuxe Audio Transformer actually puts the development of the "audio side" ahead of existing acoustical devices. Faithful amplification with natural quality over the entire audible range is consistently obtained. This Audio Transformer sets a new standard of audio amplification.

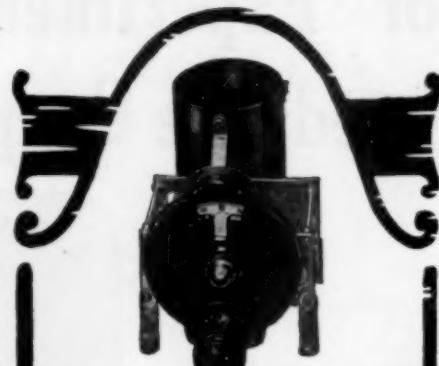
As the receiving set of the future will be power operated, the American Transformer Company is now offering two units of the finest type—especially adapted to the use of the new 7 1/2 volt power tubes in the last audio stage. These are the AmerTran Power Transformer and the AmerChoke. The Power Transformer also has filament supply windings for the power tube in the last stage and for the rectifying tube, and supplies sufficient plate current, after rectification, for the operation of the set.

Write today for interesting free booklet—"Improving the Audio Amplifier"—and price list.

AmerTran Products Are Sold Only at
Authorized AmerTran Dealers

AMERICAN TRANSFORMER CO.
178 Emmet Street Newark, N. J.

Transformer Builders for
Over Twenty-Five Years



BD-1B Includes the NATIONAL Equicyclic (straight line wave length) Condenser and the genuine BROWNING-DRAKE Inductance Coil with the new Type B Dial. Price \$10.25

THE NEW NATIONAL Tuning Units

Comprising the genuine
BROWNING-DRAKE SPACE WOUND
TRANSFORMER
and the

NATIONAL Velvet Vernier
Dials and Condensers

Are now in the hands of your dealer. Their beauty and efficiency will greatly surprise you. See them at your dealer's.

Send for Bulletin 105 R. B.

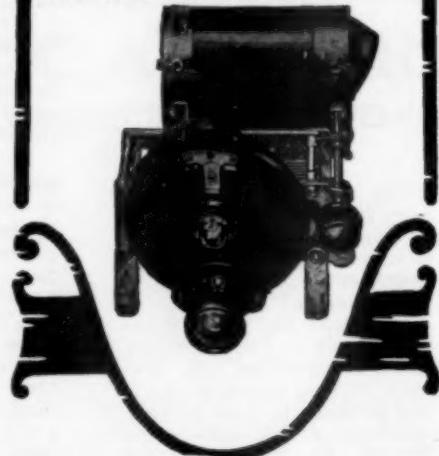
NATIONAL COMPANY, Inc.

W. A. READY, President

110 Brookline St., Cambridge, Mass.

BD-2B

Includes the NATIONAL Equicyclic (straight line wave length) Condenser and the genuine BROWNING-DRAKE Transformer with the new Type B Dial. Price \$13.75



GUARANTEED TELEPHONE CONDENSERS

1/2—MF 25c,	7/10—MF 30c,	1—MF 35c
1 1/2—MF 40c,	2—MF 50c,	4—MF \$1.00

Telephone induction coils 35c

Postage extra.

BUCKEYE TELEPHONE AND SUPPLY CO.
Columbus, Ohio.



This is Mr. William H. Priess, President of the Priess Radio Corporation, with one of the batteries he uses in his new "Priess Straight Nine" circuits, which employ six stages of radio frequency amplification, with a detector tube and two stages of audio frequency amplification. Mr. Priess is sponsor of radio frequency amplification and the reflex principle in America and the latter owes its name to him.

PRIESS RADIO CORPORATION
693 Broadway March 29, 1926
New York, N.Y.

Mr. G. Charter Harrison, March 29, 1926
French Battery Company,
Madison, Wisconsin

Dear Mr. Harrison:

I have been using RAY-O-VAC "B" Batteries for the past two years, and have found them very satisfactory in receiver circuits. The batteries have a low initial resistance and a consistent long life. They also have a very small battery noise.

You will appreciate, of course, the importance of this last-mentioned factor, especially in the detector tube circuit. I have found many cases in my experience where noises have been ascribed to static, whereas the noises have been merely due to noisy batteries. This destruction of reception quality caused by battery noises can be cured by utilizing batteries such as the RAY-O-VAC.

Very truly yours,
PRIESS RADIO CORPORATION

William H. Priess
President.

WHP:MN



SAY YOU SAW IT IN QST—IT IDENTIFIES YOU AND HELPS QST

"Bill" Priess approves these batteries

. . . because of their "low internal resistance and consistent long life" . . .

FEW hams, anxious as they may be to pick up and amplify weak DX signals, ever put radio batteries to as severe tests as they have received in the laboratories of the Priess Radio Corporation.

When you get to working with both radio and audio frequency in the same tube, as "Bill" Priess does, you are asking a lot of your batteries. The slightest battery noise, the slightest multiplication of battery internal resistance, spoils the whole works.

So there is no wonder that Mr. Priess employs Ray-O-Vac batteries in his experimental work. No other batteries have such low internal resistance or such staying power under trying conditions.

Give your apparatus the same chance to work at its best, as Bill Priess gives his. Install Ray-O-Vac batteries and increase the range of your set for both transmission and reception. Ray-O-Vac batteries cost no more than ordinary batteries.

Your regular radio dealer can furnish you with Ray-O-Vac batteries. Ask for them by name. If you have any trouble getting them, write us for the name and address of a nearby dealer who can supply you.

FRENCH BATTERY COMPANY Madison, Wisconsin

Also makers of Ray-O-Lite Flashlight Batteries and Ray-O-Lite Flashlight Cases

Ray-O-Vac "B" batteries in all standard sizes, both flat and upright.

Ray-O-Vac "A" batteries recuperate during rest periods, lasting longer and giving excellent reception.

Ray-O-Vac 4½ volt "C" batteries with 3 variable terminals give voltage adjustments of 1½, 3 and 4½ volts.



Build that Set so as to Deserve Rauland-Lyrics

Gone is the day of the jerry-built radio. Whether you build for use or for profit—one set or a hundred thousand—skimping on quality does not pay.

For the radio frequency stages, choose any good circuit and any type of coils you like—opinions differ. But, having chosen your circuit, be fair to it—let us show what it really can do—give it the benefit of Rauland-Lyrics.

Rauland-Lyric
AN
ALL-AMERICAN
TRADE MARK
TRANSFORMER

FOR THE MUSIC LOVER

The Choice of Noted Music Critics

Rauland-Lyric is a laboratory-grade audio transformer designed especially for music lovers. The price is nine dollars. Descriptive circular with amplification curve will be mailed on request. All-American Radio Corp., 4205 Belmont Ave., Chicago, U. S. A.

Member R. M. A.
Owning and operating station WENH-298Meters
ALL-AMERICAN
Radio Built for Years to Come

PYREX

Reg. U. S. Pat. Off.

1 BD Plainfield, Vermont, went on the air for the first time March 29th and on April 4th from 6:00 to 6:30 A. M. worked 6BIL California and was reported R.5. The input power was not over 25 Watts.

1 BD uses Pyrex amateur type insulators.

The MacMillan Arctic Expedition of 1925 used Pyrex and the Byrd Arctic Expedition of 1926 is using Pyrex.

The Coast Guard Ice Patrol, the Navy, the Air Mail Service, the Lighthouse Service all use Pyrex Insulators.

PYREX GIVES RESULTS

CORNING GLASS WORKS

Industrial and Equipment Division

Corning New York

THREE "E" STRAIGHT LINE RHEOSTAT

Perfect Control of Filament Temperature
Gives you a fine, smooth, dependable variation of filament temperature. Runs smoothly, is absolutely NOISELESS, and once set, "stays put!" Controls volume smoothly, and without distortion, over the entire range. Equally efficient for short and long wave sets. all models. An precision instrument at once. Ask your dealer or write direct. Price \$2.50. Postpaid.

Illus.
2 1/2 Size
6-15-30 Ohms
ELECTRICAL ENGINEERS EQUIPMENT CO.
Radio Division
708 W. Madison St., Dept. 7 Chicago, Ill.
Information on Request

AEROVOX
"Built Better"

RESISTOFORMERS
Tested and approved by M. I. T.,
Yale, Radio News, Popular
Radio, and Popular Science
Magazine over 200 of America's
leading set manufacturers.
AEROVOX WIRELESS CORP.
489-491-493 Bromne St., New York
Branch Office:
St. Louis, Mo.; Syndicate Trust Building,
Chicago, Ill.; 100 W. Jackson Blvd.;
Boston, Mass.; 100 W. Tremont Street;
Los Angeles, Calif.; 324 N. Spring St.

SAY YOU SAW IT IN QST--IT IDENTIFIES YOU AND HELPS QST



NO Radio Unit is any better than its Coil! Every Engineer and Manufacturer realizes this. While it is true of all Electrical Apparatus it is more true of Radio.

The performance of Battery Eliminators, Audio Transformers, Loud Speakers, and all other Radio Units is in exact ratio to the efficiency of their windings. *It's the coil that does the work!*

The great DUDLO Plants at Fort Wayne, Indiana, have specialized on fine Magnet Wire and Windings for many years, and DUDLO is today the

chief source of supply to manufacturers in the Radio Industry.

DUDLO Engineers and Manufacturing Facilities provide you with the widest experience and knowledge and the finest methods of production. The DUDLO plants, the largest of their kind in the world, and equipped with miles of special machinery and an immense organization of trained specialists, produce better coils and windings for your product than any other source of supply—and do it more efficiently from your standpoint.

It is probable that you already are using DUDLO Coils and Magnet Wire. If not, we will promptly make up samples and quote on your requirements. No obligation—it is part of DUDLO Service. Correspondence invited.

DUDLO

MAGNET WIRE AND WINDINGS

DUDLO MANUFACTURING CORPORATION

Eastern Office
Office and Warehouse
NEWARK, N. J.

SAY YOU SAW IT IN QST—IT IDENTIFIES YOU AND HELPS QST

MAIN WORKS AND GENERAL OFFICES
FT. WAYNE, INDIANA

Chicago Office
160 N. La Salle St.
CHICAGO, ILL.

DON'T MISS IT, FELLOWS—EVERYBODY'S COMING!

The First Annual

**ATLANTIC DIVISION
A.R.R.L. CONVENTION**

**HOTEL LAFAYETTE
BUFFALO, N.Y.**



**JUNE 24, 25, 26,
1926**

**Technical Talks—Contests
Government Exams—Real
Short-Wave Dope**

SEND IN YOUR RESERVATION TO

**Special Illumination of
Niagara Falls
Banquet—Stunts—Fun**

The Radio Association of Western N.Y.

598 Masten Street, Buffalo, N.Y.



Bring Your Set Up-to-Date

Dongan, with several other manufacturers, has gone through the experimental stages and now offers B-Power Units (Transformers and Chokes) for Raytheon and other type Eliminators that were found without question to furnish the most satisfactory known source of B-Power. You can build your own Eliminator according to simple diagram at slight expense.

Ask your dealer or send money-order to factory direct.



Tubes. \$7.00 List. Special Transformers for trickle chargers.

TRANSFORMERS

Manufactured in 25, 40,
50 and 60 cycles.
No. 509. Full Wave for
Raytheon Tubes.
No. 537. Full Wave for
R.C.A. UX-213 Tubes.
No. 538. Half Wave for
R.C.A. UX-216-B Tubes.
No. 561. For R.C.A.
UX-216 Tubes.
No. 1572. For New 80
Milli-Amp Raytheon

Milli-Amp Raytheon
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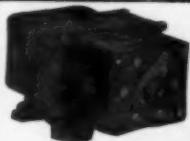
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"If we had an audio amplifier that amplified one pitch only, and did not amplify the line leaks and static and off-tune signals, we would be able to use one stage to better advantage and often could use two stages, bringing in signals that cannot be read with one stage. In other words, we would be able to make the signal stand out from the noisy background. . . . The best known example (of this peaked audio amplifier) is the OLD General Electric Transformer sold by the Radio Corporation as the UV-712. This had a 9/1 ratio; in other words, there was not a great deal of primary. It was meant to amplify 500-cycle spark signals (1000-cycle tone) and it did that in beautiful shape because resonance occurred in the neighborhood of 1000 cycles, but not sharply enough to result in ringing or "dragging".

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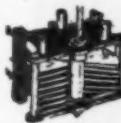
RCA MAGNETIC MODULATOR, UT-1367, 3½ to 5 amperes. Requires No Adjustment; Ideal for Radiotron Telephone Operation. For I.C.W. Transmission, and C.W. Transmission with Modulator. List \$17.00. SPECIAL, \$9.50.

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We beg to remain
Respectfully
FRANCIS P. HOUDINA CO.
F. P. HOUDINA, Pres.

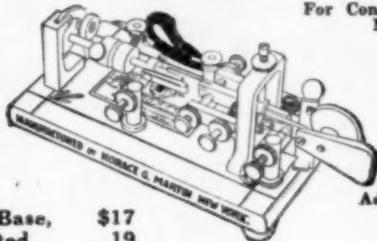
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Here is the new FROST-RADIO
Metal Frame
Rheostat
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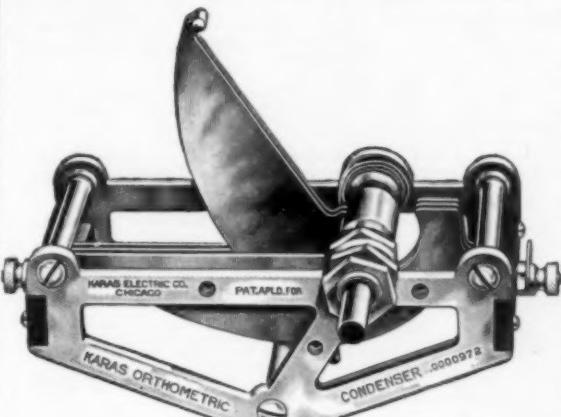
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Not only new and radically different, but infinitely better! Sturdy one piece nickel plated frame insures precision operation and smooth, non-wearing action. As frame cannot warp or bend, shaft alignment is permanent. Bakelite pointer knob; tinned soldering lugs; 2, 4, 6, 10, 15, 20, 25, 30 and 35 ohm types 50c. 200-400 ohm potentiometer, 65c. A remarkable achievement. Ask your dealer about the new FROST-RADIO Bakelite Rheostat.

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Karas Orthometric Short Wave Condensers		
5 plate	.0001	\$6.50
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11 plate	.00025	\$6.50
Karas Orthometric Broadcast Condensers		
17 plate	.00035	\$6.75
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The Harmonik was the original audio transformer with a sufficiently large primary and core to pass the entire range of musical frequencies. With the introduction of Karas Harmonik, radio listeners heard perfect reproduction for the first time. That larger primary and larger cross section core give tone quality and freedom from lost notes. It is this principle of design, evolved by Karas, that other makers of better grade transformers are trying to incorporate.

"High voltage amplification per stage" may be something you know little about, but its presence means volume plus. This higher amplification per stage without distortion, is one of the exclusive features that makes the Harmonik the most popular transformer in the country.

Now that we have power tubes for the last stage of audio frequency amplification, with characteristics such that this output stage can handle all the energy impressed on it by one preceding tube and two Harmoniks, you can obtain full, round volume every time. Low notes and high notes, vital overtones and rich harmonies at all frequencies, pass through such a system without that slighting of some and over-emphasizing of others, which so long gave to Radio reproduction that "canned" effect.

Order Through Dealer or, Direct on This Coupon

Karas Condensers in the 23, 17 and 11 plate sizes are sold by good Radio Parts Dealers in most cities. The 7 and 5 plate sizes are not so widely stocked by dealers. Orders will be filled direct, or may be placed through your dealer and his jobber. If you prefer to order direct, use this coupon. Send no money. Just pay the postman the price plus a few cents postage.

KARAS ELECTRIC CO.
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Offices: 1070 Association Building
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When you undertake the construction of a multi-tube receiver (such as is necessary today), you are investing quite a sum of money in parts. Also many hours of drilling, assembling and wiring—and your reputation as a set builder.

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Lieutenant Schnell of the A.R.R.L. has tested many condensers—and he uses Karas Orthometrics. Milton B. Sleeper of Radio Engineering has tested them—and he recommends Karas. Scores of other well-known leaders in Radio, with facilities for tests, are enthusiastic about Karas Orthometrics.

Because every Karas condenser is as electrically and mechanically perfect as such equipment can be today, you know there will be minimum possible losses when Orthometrics are used. The higher cost of a Karas condenser is "the price of perfection"—made necessary by quality materials, finest possible workmanship and most rigid inspection.

The Orthometric condenser has an exceptional minimum to maximum capacity range. It turns smoothly and evenly throughout that range. The skeletonized end plates are far from the stator plates. The active plates themselves are made entirely of brass. And with the proper coil, an Orthometric gives an absolutely equal 10 kilocycle separation of broadcast channels between 200 and 550 meters.



Karas Harmonik Transformer \$7.00

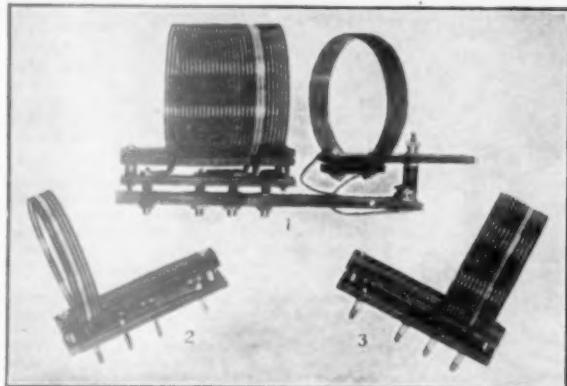
Karas Electric Co., 1070 Association Bldg., Chicago.

Please send me.....Karas Harmonik Transformers and.....Karas Orthometric Condensers, sizes as checked below. I will pay the postman the price plus postage upon delivery. It is understood that I have the privilege of returning these condensers and transformers for full refund any time within 30 days if they do not prove entirely satisfactory.

..5 plate; ..7 plate; ..11 plate; ..17 plate; ..23 plate.

Name
Address
If you send cash with order, we'll ship condensers and transformers postpaid.

GROSS Short-Wave Plug-in Coils



General Radio Jacks and Plugs used.
Most efficient plug in arrangement on
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Can be handled freely without fear of
injuring coils, also making possible per-
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Minimum amount of dielectric in-
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Without question the most rugged re-
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Spaced winding insuring minimum dis-
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Price for 80 Meter Band complete with
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Separate coils only for 20, 40, or 80 meters

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PRICE WITH FLASH LAMP \$18.75

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AUDIO TRANSFORMER

This new SM 220 Audio Trans-
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just twice as good as any audio
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No. 601* Receiver, treasure chest type. 6-tube; totally shielded; dual control; operates horn or cone type Loud Speaker; Equipped with voltmeter; Solid Mahogany. \$210 without accessories.

Tone quality, volume, range, selectivity, and non-radiation—all these desirable features are perfected in the Stromberg-Carlson Receiver by the total shielding of the radio frequency circuits.

Total shielding permits employing three stages of radio frequency amplification without interstage coupling instead of two stages,—the limit in an unshielded receiver. This third stage adds not only 8 times more amplification to the detector but also approximately 50% more selectivity.

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Wire wound. No carbon or graphite. Vitreous enameled. Hard to break but easy to use. Soldering lugs. Values assorted to give all desired resistances for *B* eliminators or radio experimental work. Eight resistors in kit.

1 Resistor 750 Ohms
3 Resistors 1500 Ohms each
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Total 21,750 Ohms

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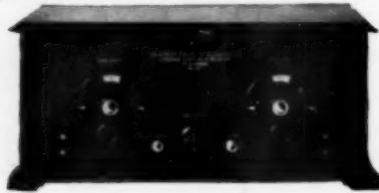
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The A. R. S. Co. Short Wave Receiver

A notable achievement in short wave receiver design. Absolutely LOW-LOSS THRUOUT. Designed and built EXPRESSLY for EFFICIENT, DEPENDABLE reception on the high frequencies.

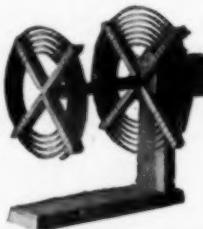


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R.E.L. COILS

Receiver with Aero Plug-in Coils (as above) \$48.50

The A. R. S. Co. No Loss Inductance



Wound with heavy brass on specially treated KILN dried maple. Highest Insulating Qualities. Adjustable Coupling. Maximum Energy Transfer. Q.S.T. RECOMMENDS IT

Special Price

20 and 40 meter size \$4.95
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Cardwell Receiving Condensers Rebuilt for Transmitting Purposes

Ideal for primary or antenna and counterpoise series. 2,000 Volt Flashover Test Capacity .0002 MFD.



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\$3.95

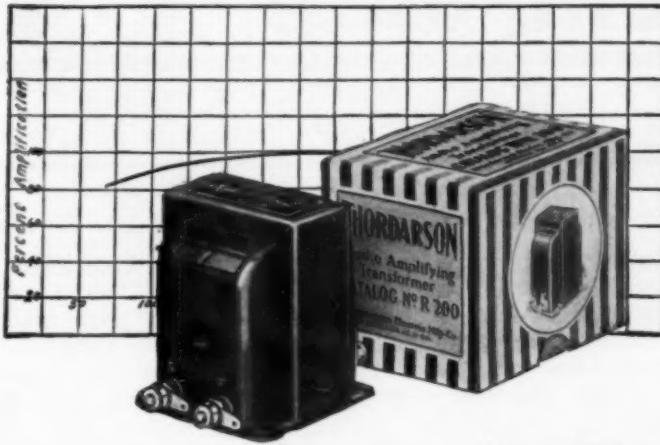
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R-200 Price, \$8.00

WHEREVER tone quality, timbre, and perfect reproduction are paramount, Thoradson amplifying transformers predominate.

The better receiving sets of today are musical instruments of the highest order. More than fifty of these leading set makers specify Thoradson transformers as standard equipment.

The R-200 is used in sets costing up to \$2500.00. A superlative transformer giving good bass note reproduction. Ideal for use with cone type speakers.

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Write for literature describing these and other Centralab super-quality controls.

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Wouldn't you like to become a member of the American Radio Relay League? We need you in this big organization of radio amateurs, the only amateur association that does things. From your reading of *QST* you have gained a knowledge of the nature of the League and what it does, and you have read its purposes as set forth on page 6 of every issue. We would like to have you become a full-fledged member and add your strength to ours in the things we are undertaking for Amateur Radio, and incidentally you will have the membership edition of *QST* delivered at your door each month. A convenient application form is printed below—clip it out and mail it today.

.....1926

**American Radio Relay League,
Hartford, Conn., U. S. A.**

Being genuinely interested in Amateur Radio, I hereby apply for membership in the American Radio Relay League, and enclose \$2.50 (\$3 in foreign countries) in payment of one year's dues. This entitles me to receive *QST* for the same period. Please begin my subscription with theissue. Mail my Certificate of Membership and send *QST* to the following name and address.

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Station call, if any

Grade Operator's license, if any

Radio Clubs of which a member

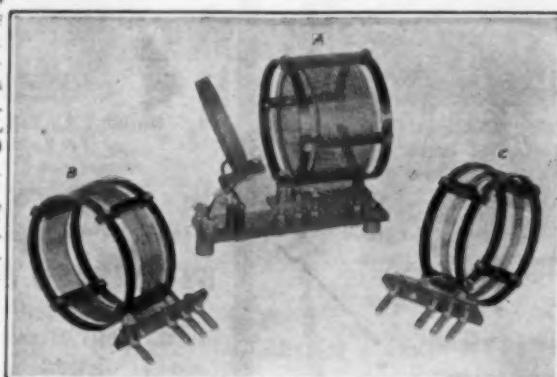
Do you know a friend who is also interested in Amateur Radio, whose name you might give us so we may write him about the League?

..... Thanks!

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Note its advantages listed below—and try and do without it!

1. Positive contact is secured through General Radio plugs and jacks.
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Coil No. 4, 125-250 M

Price \$4.00

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These coils are essential to the most efficient operation of your station. Order your TODAY.

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ROBISON'S MANUAL OF

RADIO TELEGRAPHY and TELEPHONY

6th EDITION

This book, written for the U. S. Navy, first appeared in 1907, the author being Lieutenant (now Admiral in command of the U. S. Fleet) S. S. Robison, U. S. Navy. This edition has been revised and brought up to date by Commander S. C. Hooper, U. S. Navy, Radio Officer of the U. S. Fleet during the past year. A review of this book appeared in the December issue of QST, in which it was stated this is perhaps

"The Best Radio Book That Ever Came To This Desk"

The review was as follows:

"The famous 'manual' has, in its 6th edition, risen to entirely new heights. This last edition ranks with the very best of all published radio matter and adds to its usefulness the excellent printing and binding that has marked the earlier issues."

Never have we seen a book that so well followed out the plan of starting with simple theory but always keeping in mind that the reader was interested in the application of the theory, and cared nothing about the theory itself. Therefore the text progresses rapidly to the actual apparatus and discusses the modern types clearly, rapidly and usefully.

This book is so universal that it deserves unusual treatment and shall have it—here are the chapter headings in full.

- 1—General Theory
- 2—Elementary theory of electricity
- 3—A.C. Theory
- 4—A.C. Theory applied to radio
- 5—Damped oscillations

- 6—Wave propagation
- 7—Radio Instruments
- 8—Radio Transmission
- 9—Radio Reception
- 10—Theory of vacuum tubes
- 11—Vacuum-tube transmitters

Part 2—Practical application of apparatus and measurements

- 1—Practical application of apparatus
- 2—Radio measurements

Part 3—Useful Information

- 1—Tables and formulas
- 2—Mathematics (Arithmetic, Algebra, Geometry, trigonometry)
- 3—Radio Laws
- 4—Miscellaneous

Part 4—Index

That is a tremendous territory to cover in a single volume, and it takes almost 900 pages to do the job. However, the job is done and the result is a book that is not only worth \$8 which it costs but is perhaps the best radio book that ever came to this desk."

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Sponsored by Popular Radio, endorsed and described by Radio publications and Newspapers from coast to coast. Perfected Single Control—Unlimited wavelength range—Volume equal to 6-tube receivers—Quality unsurpassed and hair-line selectivity. Easily assembled by even a beginner with just a screw driver and pliers.

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JAMAICA PLAIN, BOSTON, MASS., U.S.A.
ELECTROSTATIC CONDENSERS FOR ALL PURPOSES

A. R. R. L. Members -- What about your friends?

You must have a friend or two who ought to be members of our A.R.R.L., but aren't. Will you give us their names, so that we may write to them and tell them about the League and bring them in with the rest of us? The A.R.R.L. needs every eligible radio enthusiast within its ranks, and you will be doing your part to help bring this about by recommending some friends to us. Many thanks.

1926

American Radio Relay League,
Hartford, Conn.

I wish to propose

Mr. of

Mr. of
Street & No. Place State

for membership in the A.R.R.L. I believe they would make good members. Please tell them the story.

Deforest

20 Watt

Transmitting Tubes

<i>Fil. Volts</i>	.	.	.	10.
<i>Fil. Amps</i>	.	.	.	2.35
<i>Plate Volts</i>	.	.	.	750-1000
<i>Plate Current</i>	.	.	.	40-50MA

Price \$12.00 Parcel Post Prepaid

RADIOPHONE SALES CO.

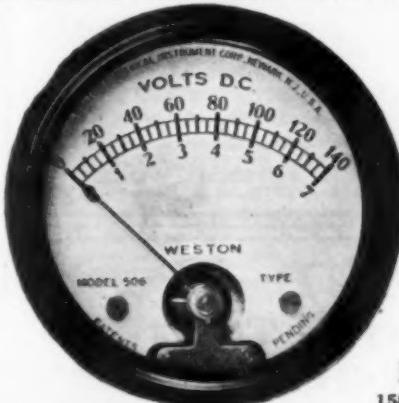
216 West 58th St.

New York City, N. Y.

Exclusive Sales Rights—Deforest Specialists

WESTON

**506 Voltmeter and
Universal Bi Polar Switch**



GIVE economy and positive Set control. A twist of the switch . . . quick check on all voltage conditions on the double scale (140/7 volts) voltmeter. Adaptable to all makes and models of receiving sets. Made by the Weston Craftsmen of Quality Radio Instruments, and makers of the leading models of measurement device in every field of electrical work. Its use insures operation of tubes at proper filament voltages and economical use of batteries. For further information request circular.

Weston Electrical
Instrument Corporation
158 Weston Avenue Newark, N. J.



STANDARD THE WORLD OVER
WESTON

Pioneers since 1888



SEE
THAT
SCREW



A screw-driver
adjusts an X-L
in crowded
places.

X-L VARIO DENSER

Results in easier tuning, more di-
ance, volume and clarity—greater stability Indorsed
by leading radio authorities.

Model "N"

A slight turn obtains correct tube oscillation on all tuned
radio frequency circuits. Neutrodyne, Rogers two tube,
Browning-Drake, Meloduro Silver's Knockout, etc., capacity
range 1.8 to 20 micro-micro farads. Price \$1.00

Model "G"

with grid clips obtains the proper grid capacity
on Cokasay circuits, filter and intermediate frequency tuning in heterodyne and positive grid bias in all sets. Capacity range
.00018 to .00055 and .0003 to .001 micro
farads. Price \$1.50

X-L Push Post

Push it down with your thumb, insert wire,
remove pressure and wire is firmly held.
Released instantly.
Price 15c.

X-L RADIO LABORATORIES
2428 Lincoln Avenue N.
Chicago, Ill.



What Size Grid and Plate Blocking Condensers?

You have always used .002 mfd. for blocking condensers but who knows that it is the best size for short waves? The builders of KFUH believe .000036 mfd. better for their tuned grid 'n plate circuit. Our UC 1015 condenser gives eleven different capacities between .0002 mfd. and .001 mfd. so you can select the best size for your set. Why not try them?

Price \$1.25 postpaid

General Electric Gridleaks



Brand new enameled porcelain
G. E. Gridleaks in 5000 ohm
and 10,000 ohm sizes for all
tubes.

PRICES, 5000 ohm \$1.25, 10,-
000 ohm \$1.75, Postpaid.

Utility Radio Co., 80 Leslie St., East Orange, N. J.



GENUINE Kenotron Rectifying Tubes Model UV-216



THESE Tubes are the GENUINE R.C.A. Kenotron Rectifying tubes.
Filament voltage $7\frac{1}{2}$ volts and will safely stand A.C. input of 750 volts. Four
of these tubes will run a 50 watteter.

These Rectifying tubes will pass plenty of current and voltage for your
TRANSMITTER and also are very efficient for use in "B" ELIMINATORS.

STANDARD BASE, EVERY TUBE BRAND NEW AND PACKED IN ORI-
GINAL CARTONS.

List price \$7.50 ea.—Extra Special \$1.85 ea.

AMERICAN SALES CO., 21 Warren Street, N. Y. C.

SAY YOU SAW IT IN QST—IT IDENTIFIES YOU AND HELPS QST

TOAZ DUBBELUGS

May now be had in highest quality
tinned stock in nominal lengths of
1, 2, 3, 4, 5 and 6 inches, correspond-
ing to $\frac{3}{4}$, $1\frac{1}{8}$, $2\frac{1}{8}$, $3\frac{1}{8}$, 5 and $6\frac{1}{8}$
between holes.

Let's You Build Without Solder

**Price \$7.50 Per M
Nominal Inches**

SPECIAL PACKAGE

Nominal 125 Inches Any Assortment

\$1.00 Net

Toaz Engineering and Sales Co.,
11703 Robertson Ave., Cleveland, Ohio.



ARE YOU BUILDING A NEW SET?

If so—you will need instruments. Tell us your story and
we will recommend the best instrument to use.

Ask for Circulars

JEWELL ELECTRICAL INSTRUMENT CO.
1650 Walnut St. - Chicago

"36 Years Making Good Instruments"

RARE GAS AND HIGH VACUUM PRODUCTS

Neon, Helium, Argon, etc.

We specialize in construction and development
of all types of special thermionic valves, Neon
glow lamps, Neon arc lamps, Mercury arc lamps,
hot cathode and gas filled rectifiers, tubes utilizing
the alkali and alkaline earth metals, and photo
sensitive apparatus.

Also, high vacuum pumps, manifolds, etc., made of lead,
limo pyrex or quartz glass. Special high frequency ap-
paratus for electronic bombardment.

Flashlamps

1. Neon flash lamps for oscilloscopes, wavemeters, etc.
Price \$3.50.
2. We are the makers of Hyvo—the really safe high
voltage indicator.
3. Newest developments in photoelectric cells. Price \$15.
Complete equipment for high vacuum work installed.

RADIO ELECTRICAL WORKS
Research Division, 23 Union Sq., New York, N.Y.

HAM-ADS NOTICE

Effective with the July, 1926 issue of *QST* the policy of the "Ham Ad" Department will be altered to conform more nearly to what it was originally intended that this department should be. It will be conducted strictly as a service to the members of the American Radio Relay League, and advertisements will be accepted under the following conditions.

(1) "Ham Ad" advertising will be accepted only from members of the American Radio Relay League.

(2) The signature of the advertisement must be the name of the individual member or his officially assigned call.

(3) Only one advertisement from an individual can be accepted for any issue of *QST*, and the advertisement must not exceed 100 words.

(4) Advertising shall be of a nature of interest to radio amateurs or experimenters in their pursuance of the art.

(5) No display of any character will be accepted, nor can any typographical arrangement, such as all capital letters, be used which would tend to make one advertisement stand out from the others.

(6) Contracts for "Ham Ad" advertising which are now in force, and which have until later than July, 1926, to run, will be completed in accordance with the understanding under which they were made, but cannot be renewed.

(7) No new contracts will be made for "Ham Ad" advertising after March 20, 1926.

(8) The "Ham Ad" rate will be 7c per word, and remittance for full amount must accompany copy.

(9) Closing date remains as heretofore; the 25th of second month preceding date of publication.

(10) This notice will be published in the May and June, 1926 issues of *QST*.

TELEGRAPHY—Morse and Wireless—taught at home in half usual time and at trifling cost. Omnidigraph Automatic Transmitter will send on Sounder or Buzzer unlimited messages, any speed, just as expert operator would. Adopted by U. S. Govt. and used by leading Universities, Colleges, Technical and Telegraph Schools throughout U. S. Catalog free. Omnidigraph Mfg. Co., 13M Hudson St., New York.

HAMS. A PENNY FOR YOUR THOUGHTS, IS A TRITE EXPRESSION, "BUT" TWO PENNIES ON A POSTAL CARD ASKING FOR PRICE LIST OF TRANSMITTING PARTS, WILL PROVE TO BE A MONEY SAVER. FOR INSTANCE, PLUG IN COILS ARE QUITE TROUBLESOME TO BUILD, UNLESS YOU SAY YOU SAW IT IN *QST*—IT IDENTIFIES YOU AND HELPS *QST*

HAVE SOME GENERAL RADIO COIL MOUNTING ACCESSORIES. THEY ARE ADAPTABLE TO ANY TYPE OF COIL, SEND YOUR Q&A TO THE ONLY HAM STORE IN THE FIFTH DISTRICT. FORT WORTH RADIO SUPPLY CO. FORT WORTH, TEXAS.

REAL BARGAINS:—New and perfect UP-1016, 750 watt Power Transformers, 3000v with midtap; Filament winding 10v with midtap, \$10.00; UP-1658, Filament Transformers 75 watt, 7.5v with midtap, \$4.00; UP-1658 UV-712 Audio Transformers 9/1, \$2.00; UC-1831 4000v Variable Transmitting Condensers, \$1.50; UC-1803 Antenna Coupling Condensers, \$1.50; Genuine Holtzer-Cabot No. 4 Headphones, 2200 ohms, double pole, high grade, \$3.00; Genuine Cardwell Type 123-B Variable Condensers .0005 \$2.50; Signal R-48 Telegraph Keys \$2.25; Jewell Meters for immediate delivery, send for catalog. UC-490 Filter Condensers 1750v, 1mfd. \$2.25; UC-1014 Grid Condensers, \$.22.5c; 1000v Mica Condensers, .001 mfd. Bakelite mounted, 25c. Bakelite Navy Key Knobs, 25c. Cutler-Hammer Variable Grid Leaks, 35c. AMRAD No. 2796 Lightning Switches mounted on 5" porcelain posts, \$1.50. Day-Fan Balanced Vernier Condensers, 7 or 13 plates may be used, Bakelite ends, \$1.50—F-F Battery Chargers 6 amps, 110v AC 60 cyc. \$9.00. Send for discount sheet and keep in touch with bargains. 25% deposit on C. O. D. orders. All items under 4 lbs. postpaid. STATE RADIO CO., 286 Columbia Road, Dorchester, Mass.

EVERYTHING IN RECEIVING apparatus. 25% discount to "hams". Over 2 pounds data, catalog, etc.—prepaid—25c. Kladag Laboratories, Kent, Ohio.

EXCHANGE—What NEW RECEIVING parts do you want? Can use perfect, latest model RECEIVING parts, in new condition, in exchange. No sets. **RADIO EXCHANGE**, KENT, OHIO.

NEW Western Electric Power Amplifier, complete with horn and tubes, \$55.00. Box 1450, Springfield, Mass.

PERMANENT PLATE POWER. A LIFE-TIME STEEL ALKALINE EDISON B BATTERY. (THE SML KIND). ELECTRICALLY WELDED FOR ABSOLUTE QUIET. 54 VOLT \$8.25, 100 VOLT \$15.00. IN FUMED OAK POLISHED CABINET. REAL EDISON SOLUTION. THAT BIG SET NEEDS A POWER HOUSE. HERE TIS—2000 MILIJAMP HOUR. 105 VOLT \$24.00, SAMPLE CELL 30c. GIANT SUPERCELLS 4000 MILIJAMP HOUR 40c CELL, SAMPLE 50c. 3 RUNS YOUR 199. PEPPY ELEMENTS—WELDED PAIRS 7½c. SEPARATORS ¼c. ¾ x 6" TUBES 3c. 1"–4c. BATTERY OR RECTIFIER SHOCKPROOF JARS 1" x 6"—4c, 1¼ x 6½"—5c. PURE SOFT .032 NICKEL 1c. .034 (HEAVY) 1¼c ft. REAL EDISON ELECTROLYTE (THAT'S NO LYE) LITHIUM COMPOUND \$1.25 MAKES 5 lbs. COLLOID B CHARGER \$2.00 SMALL, \$3.00 LARGE. FOR A PERMANENTLY PERFECT AERIAL No. 12 SOLID COPPER ENAMELED 75c—100 ft. MINIMUM RESISTANCE—MAXIMUM RECEPTION. INSULATORS—PYREX BOWL LEADIN \$1.50, IMPREGNATED OAK STRAIN 20—\$1.00. WRITE IN GANG. **RADIO SML**.

FRANK M. J. MURPHY,
4837 ROCKWOOD RD.,
CLEVELAND, OHIO.

NEW GENERATORS, rated at 275 volts 120 watts will give 500 volts \$8. UC1831 variable 4000 volt condensers \$1.50. Bakelite 3 coil honeycomb, geared mountings \$1.50. Western Electric microphones \$1. VT2a \$4, VT1a \$3. Used generators, 30 volt direct current input, output 300 volts \$8. 500 cycle 200 watt \$10. ½ KW \$15. SEND STAMP for list. R. Wood, 38 Way Ave., Corona, New York.

EDGEWISE wound copper ribbon, the only really satisfactory antenna inductance; 3½" outside diameter 10c turn; 4½" 13c turn; 5½" 15c turn; 6½" 17c turn; 7½" 20c turn, prepaid any number turns in one piece; Geo. Schulz, Calumet, Michigan.

MUELLER 150-WATT INPUT POWER TUBES \$15.00 socket FREE. CURTIS-GRIFFITH, FORT WORTH.

HEADQUARTERS FOR HAM STUFF: ASK FOR OUR CATALOGUE A-2. WE SPECIALIZE IN AMATEUR TRANSMITTING AND RECEIVING APPARATUS. NO. 12 "DYNEX" SOLID COPPER ENAMELED AERIAL WIRE, 1c FT. NO. 10 (FOR HEAVY DUTY), 1½c FT. NO. 14, ¾c FT. PYREX GLASS TRANSMITTING IN-

SULATORS, 12" \$1.50; 7½" \$1.50. RECEIVING SIZE 45c. PYREX LEAD-IN BOWLS, \$1.50. WE ALSO CARRY THE PYREX STAND-OFF INSULATORS. FERON LEAD-IN INSULATORS, \$1.10. BARKELEW LIGHTNING SWITCHES, \$2.50. WARD-LEONARD 5000 OHM GRID LEAKS, \$2.00. ALLEN-BRADLEY RADIOSTAT, \$6.50. TYPE E-210, \$4.00. RADIOLEAK (VARIABLE TRANSMITTING GRID LEAK), \$5.00. ACME 2 MFD. 2000 VOLT CONDENSERS, \$6.50. 2 MFD 750 VOLT CONDENSERS, \$2.50. FEDERAL 1 MFD. 1000 VOLT, \$2.00. RCA, UC-490, 1 MFD. 1750 VOLTS, \$2.50. FEDERAL MICRAPHONES, DESK TYPE, \$6.50. HAND TYPE, \$7.00. NATIONAL AND CARDWELL TRANSMITTING CONDENSERS IN STOCK. ALL SIZES ACME CHOKES AND TRANSFORMERS. A FULL LINE OF JEWELL METERS. THORDARSON 80 WATT FILAMENT TRANSFORMER, \$7.00. 150 WATT, \$10.00. 300 WATT \$15.00. THORDARSON PLATE TRANSFORMERS, 100 WATT, \$13.00. 450 WATT, \$18.00. 900 WATT, \$30.00. LEAD AND ALUMINUM, 90c SQ. FT. "DYNEX" KEM ELEMENTS. 1" x 4", 6c EACH. 1" x 6", 7c. 1½" x 6", 8c. BREMER-TULLY PLUG-IN HAM TUNER, \$8.00. BRADLEYSTATS, \$1.85. GAROD-PYREX SOCKETS, \$1.50. PYREX SOCKETS FOR UX TUBES, 70c. NATIONAL, KARAS, GENERAL RADIO AND CARDWELL CONDENSERS FOR THAT SHORT WAVE TUNER. NATIONAL VELVET VERNIER DIALS, \$2.50. NO. 16 COTENAMEL, 75c LB. THE NEW CITIZENS RADIO CALL BOOK (HAM EDITION), 75c. "EVERYTHING FOR THE HAM" IS OUR MOTTO. "DYNEX FOR DX" OUR TRADEMARK. WE SHIP C.O.D. IF DESIRED. WE ARE THE "EIGHT THAT PAYS THE FREIGHT" EAST OF THE ROCKIES. NICHOLSON ELECTRIC CO. (OPERATING 8BIN), 1407 FIRST NORTH ST., SYRACUSE, N. Y.

ONE KW DEFOREST Transmitter CW-1CW phone. Complete with tubes, 2KW motor generator, etc. R. B. Ladd, 323 N.E. 34th St., Miami, Florida.

Five new Western Electric 50 watters \$28 each. Western Electric power amplifier, speaker and 216A tubes \$95, cost \$181. Like new. 100 volt Exide "B" battery \$20. WANTED Esco motor generator about 750 watts, reasonable. Brown, 192 South Goodman Street, Rochester, New York.

INDUCTANCES—40,80 meter transmitting. Spiral wound heavy brass ribbon. Mounted on solid oak. Variable coupling, 40 meter, \$4.90; 80 meter, \$5.25; postpaid east of Mississippi. Send for photo. H. Kaltwasser, 735 E. 166 St., New York City.

SELL, lot of transmitting and receiving sets and parts. List for stamp. Tanner, 217 East Mulberry, Springfield, Ohio.

TEE DEE (Edison element) "B" batteries are everlasting. Completely assembled; beautiful cabinet, panel and switches. 45 volt \$10, 90 \$20, 135 \$30. Write for information. Discounts to dealers.

RADIO ELECTRIC CO.,
WEST WINFIELD, N. Y.

FOR SALE: One UL1008 at \$7.00, UP1368 transformer \$15.00, UP 1626 filter reactor \$7.50, Robbins and Myers 200 watt 500 volt DC generator \$25.00, ½ HP heavy duty Wagner motor \$30, and following Jewell meters: TC RF Amp. 0-25 \$7.00, 0-500 DC volt \$8.00, 0-300 Milliamp. \$3.50, 0-10 AC volt \$4.50, and Roller Smith 0-150 AC volt \$3.00. John B. Gray, 3rd. Wilson, N. C.

??? What do you need ??? To amateurs and experimenters, we offer at reduced prices (prepaid) a full line of transmitting and receiving equipment. Write now for descriptive literature and ask for special Ham prices. M. B. S. Sales Co., Dept. H.2, 27 School St., Boston, Mass.

FOR AN EXCELLENT NOTE AND MAXIMUM DX. General Electric 24/1500 volt .233 ampere dynamotors \$45. Slightly used \$25. IDEAL FOR BATTERY SUPPLY. \$3.00 additional for belt or battery drive. Pulleys and endless leather belt for any speed motor. Excellent results. Crocker-Wheeler 24/1500 volt 450 watt \$45.00, GE 12/350 volt \$18. Shaft for motor drive \$2.00. Holtzer-Cabot 12/500 volt \$18.00. Navy Keys \$2.00. Crocker-Wheeler 500 cycle motor generators. 1500 volt meters \$15.00. Special genuine Cardwell .0005 mfd condensers \$2.00. Cut down for lower capacity. Henry Kienzle, 501 East 84th St., New York City.

90

DOUBLE spaced transmitting variable condensers completely assembled with 3½" Bakelite Dials, hard rubber end plates, nickel plated brass parts, aluminum plates, calibrated spacers, 13 plates \$3.00, 17 plates \$3.50, 23 plates \$4.00—can be immersed in oil for extra high voltages. Prepaid cash with order—satisfaction or money back. Geo. Schulz, Calumet, Michigan.

WRITE for list of bargains in used equipment. Want high voltage generator. R. Lewis, Princeton, Illinois.

BARGAINS. Synchronous motor, \$10; UV 211 tube, new, \$25; UV 204 tube, used, \$40; UV 203A tube, new, \$25; 500 volt S tubes, two, \$6 each; 0-1 Roller Smith hot-wire ammeter, \$3; 0-1 GE thermoammeter, \$5; UP1653 forty henry choke, \$6. UL1008 oscillation transformer \$7; 0-250 GE milliammeter, \$4; 0-5 GE thermoammeter, \$5; RCA 5 watt sockets, 75c each; UP1658 10 volt 150 watt filament transformer, \$5; 200 watt 500 cycle motor generator with 80 volt dc motor, \$15; 110 volt AC chopper motor, \$5; Western Electric 7A Cabinet power loudspeaker less tubes, \$25; Deforest hand microphone, \$2; Bruno shortwave coupler, \$2; Bremer Tully short wave coupler, \$2.50; Stromberg Carlson loudspeaker, \$8; Ward Leonard 5000 ohm gridleak, \$1.65; Bakelite panels 14 x 18 x ¼, \$1.50. W. M. Derrick, 80 Leslie Street, East Orange, N. J.

Building a B eliminator? Best make full wave transformer, tapped primary and secondary \$4.95. Chokes fine job fully mounted \$3.95. Block of condensers, 2, 8 and 1 Mfd \$6.25. 1 and .1 in series 95c. Salvaged 2 Mfd Condensers 75c net. UP 1016 transformer \$12.95. Write us for anything hard to get.

WRAF—THE RADIO CLUB INC., La Porte, Ind.

FOR SALE—½ KW Navy Holtzer-Cabot 500 cycle motor generator—perfect condition—complete with spares. 1 Crocker-Wheeler 24 to 1500 volt DC 450 watt—6500 RPM dynamotor—never used—\$30. 1 Acme 300 watt power transformer—perfect—\$10. All kinds of transmitting and receiving apparatus accumulated at IBV and IFB since 1917—am moving—all inquiries QSL'd. Cumming, 83 Marlboro St., Boston, Mass.

CURGRI-CO 5-WATT DX BABIES \$3.15 postpaid. (Dealers wanted.) CURTIS-GRIFFITH, FORT WORTH.

AN 8UX cartoon for your DX cards \$1. No two alike. Don Hoffman, 34 Kirkwood, Akron, Ohio.

MOTOR BARGAINS, ¼ horsepower 110 volts \$8.00. 5 watt transmitting tubes \$1.00. Receiving tubes \$6.00. 6 volt batteries \$2.75. 824 North Fifth, Philadelphia, Pennsylvania.

SELL 50 WATT EQUIPMENT (NEW). Send for prices. 1PF.

GENERAL ELECTRIC motor new ¼ h.p. \$450 RPM 32v. A bargain \$19.75. Snare Drum with complete set of traps. Cost new last year \$65. Sacrifice \$35. Ship C.O.D. Arthur Dunlap, Bowerton, Ohio.

Bids wanted on all or part ONE THOUSAND VOLTS three or four ampere hour separate STORAGE CELLS. Must be willing ship for approval before payment to arrive Seattle not later August. Reference Colonel Hartman, Signal Corps, Arcade Building, Seattle. Address Paul Estle, Bethel, Alaska.

500 cycle alternators for plate excitation and other army air service equipment.

Radio Service Shop, San Antonio, Tex.

SUPER using J. K. Long Wave Air Core Transformers and standard parts. Eight tube set which cuts down interference, selectivity tone rich and clear. Long range on loop entirely new principle in heterodyne reception. Ask for literature blue prints 50 cents. We can furnish all parts to hams at special discount. Davisco, 30-B Euclid Arcade, Cleveland, O.

SILICON Transformer Steel cut to order .014". 10 lbs. 25 cents, 5 lbs. 30 cents, less than 5 lbs. 35 cents per lb., 4 cubic inches to the lb. .007" for radio frequency transformers, 50c cubic inch, postage extra. At least ¼ cash with order—balance C. O. D. Geo. Schulz, Calumet, Michigan.

Special motor generator bargains. New motor generator sets at less than secondhand prices. We have in stock

SAY YOU SAW IT IN QST—IT IDENTIFIES YOU AND HELPS QST

a few New Westinghouse double commutator 750 V. 200 W. D. C. generators direct connected to 110 V. 60 cycle A. C. motors \$45.00 each. Field rheostat extra \$4.50 each. 25% with order, balance C. O. D. express inspection allowed. Subject to prior sale. QUEEN CITY ELECTRIC CO., 1734 GRAND AV., CHICAGO, ILL.

100 WATT power transformers 350 each side, complete. Room for filament winding, \$7.50. 9CES Frank Greben, 1927 S. Peoria St., Chicago, Illinois.

SAMPLE REPORTS.

9BNT CRESTON, IOWA. THOUGHT WAS STUNG AGAIN BUT DECIDED TO STUDY AND FIND OUT. AT THIS TIME MY SPEED LIMIT WAS EIGHT PER, AND AFTER 3 EVENINGS WITH SHORTKUT COULD DO 15 AND CAN NOW DO 20 EASILY.

4QY FORT MYERS, FLA. WAS LICENSED AND LITTLE BOOKLET LOOKED LIKE STUCK AGAIN BUT TRIED IT AND DOUBLED RECEIVING SPEED IN FIVE HOURS—HI. PUT SHORTKUT INTO EVERY HAMS DEN.

9CMW HICKMAN, KY. WHEN GOT RIGHT SLANT ON YOUR PAN RAISED MY RECEIVING SPEED FROM 15 TO 25 IN 3 EVENINGS.

Reports from 200 Hams and Quarter Coupon 25 cents. Reports from all Dists. Other information on request. SHORTKUT with Appendix and Better Key Work \$3.50 to U.S.-CAN. Elsewhere \$4: Reg. Mail: None COD: Send PO Order.

DODGE RADIO SHORTKUT, MAMARONECK, N.Y.
Trade Mark BKUMA YRLSBG Registered.

AMATEUR RADIO EQUIPMENT THAT IS GUARANTEED WILL WORK! ENSALL RADIO LAB., EQUIPMENT WILL WORK. FROM THE SMALLEST TO THE LARGEST JOB IN THE RADIO LINE WE WOULD BE PLEASED TO QUOTE ON THE PARTS ARE THE COMPLETE WORK. WE BUILD TO ORDER SPECIAL EQUIPMENT FOR AMATEUR OR BROADCAST STATIONS. INDUCTANCES, WAVEMETERS, RECEIVERS, TRANSFORMERS, ALL TYPES OF CHOKE COILS, etc., PRICES ON REQUEST. WE SUPPLY GENERAL RADIO EQUIPMENT, THORDARSON, ACME, NATIONAL, PYREX, ESCO, JEWEL WESTON, GENERAL INDUSTRIES, AND ALL OTHER WELL KNOWN AMATEUR EQUIPMENT. THE "ENSALL RADIO" SPEECH AMPLIFIER WILL PUT A KICK ON THAT PHONE OUTFIT. THE SHORT WAVE RECEIVER WE BUILD HAS A WAVELENGTH RANGE FROM 5 TO 200 METERS. WE REWIRE SUPER-HETERODYNE RECEIVERS AND GUARANTEE THEM. REWIRE AND BUILD ANY TYPE TRANSMITTER. DISCOUNTS TO DEALERS ON ANY RECEIVERS WE BUILD TO ORDER. ALSO ON A NUMBER OF THE PARTS WE CARRY. IF IT'S RADIO JUST DROP US A LINE. QUOTATIONS GLADLY GIVEN ON ANY EQUIPMENT OR PARTS. FOR THE BEST IN AMATEUR RADIO, GET QSO, THOS. ENSALL (ENSALL RADIO LAB.), 1208 GRANDVIEW AVE., WARREN, OHIO. (Designers of High Grade Amateur and Broadcast Radio Equipment).

IVORY RADIO PANEL makes most beautiful set of all, cut any size 3c square inch $\frac{3}{16}$ " thick. Also dials and knobs. Guaranteed satisfactory. Write for FREE sample. Will ship prepaid or C.O.D. Ivorylite Radio Panel Co., 3222 Ave. F, Fort Worth, Texas.

MOTOR-GENERATOR—Eco. $\frac{1}{2}$ h.p. three phase—220 volt motor; 1000 volt D.C. generator for one-third cost. 1015 Milam Place, Austin, Texas.

ESCO MG For Sale—1000 volt, 200 watt, motor 110 a.c., 60 cycles, four bearing unit, new and slightly used, A.N.I. condition. Price \$95. 9EP Lexington, Ky."

HAMS: Get our Samples and Prices on Printed Call Cards made to order as YOU want them. 9APY HINDS & EDGARTON, 10 S. Wells St., Chicago, Ill.

NO BUNK. New tubes UV203s \$21.00. UV203A's \$29.00. "S" tubes \$7.50. Can you get these cheaper elsewhere, OM? If so, please let me know. P. Running, 706 So. Third Ave., Maywood, Illinois.

THE CRICKET is better than a Bug or Beetle. It hops faster, goes farther, sings better. Listen for 5EH or write.

UNMOUNTED CHOKES—5OH-60-MA \$1.75. 3OH-5OMA \$1.50, 2OH-30 MA \$1.25. Transformers—420v from 110 SAY YOU SAW IT IN QST—IT IDENTIFIES YOU AND HELPS QST

with 6v filament winding, center tap on filament and secondary windings, TOMA for UX213 tube \$3.75. Unmounted 280v from 110-60 MA no taps \$1.75, 190v from 110-6v filament, no taps for 201A "B" eliminator, \$1.75. Audio 3-1 or 5-1 ratio .90. Write for details and list of "B2" eliminator parts and "B" supply for transmitters. Radio Parts Sales Co., Box 24, Orange, N. J.

DEFOREST "H" tube. Never used. Fifteen bucks. 6CUW, Bisbee, Arizona.

RADIOMEN—Send for our radio catalog 25% discount to hams. Radio Specialty Shop, 525 Park Avenue, Kent, Ohio.

PRIVATE—FOR HAMS ONLY. Better QSL cards. Send for samples and see for yourself. 6APK.

FOR SALE CHEAP, two used 250 watt DeForest 2-Q-15 tubes. WCAJ.

PURE ALUMINUM and lead rectifier elements, holes drilled with brass screws and nuts per pair $\frac{1}{16}$ ", 1 x 4, 18c, 1 x 6, 18c, $\frac{1}{4}$ x 6, 17c, $\frac{1}{2}$ x 6, 19c, single elements half price. Sheet aluminum $\frac{1}{16}$ ", \$1.00, $\frac{1}{8}$ ", \$1.90. Lead \$1.00 square foot all prepaid. GEO. SCHULZ, Calumet, Michigan.

LISTEN to 5EH. Sounds like an Omnidigraph. It isn't. It's the Cricket Key. No bum fests. No "glass arms"!

ESCO 500 volt 100 watt motor-generator. 120 volt DC drive. Practically new, \$20. 9UH, Milwaukee.

HAVE UP-1016 power transformer 1500 v each side, mid-tap and two "S" tubes. Want MG. Let's QSO. Roger Hill, East Liverpool, Ohio.

SELL 480 volts Willard 3000 milliamp. plate supply \$100. Deliver free one hundred miles. Transmitter DeForest H tube, three meters National transmitting condensers, filament transformer. Make offer. Receiving parts. What do you need? Sacrifice everything. A. P. Southworth, Wakefield, Mass.

IVORY RADIO PANEL is a pure white grained Ivory, the most beautiful radio panel of today. Any size $\frac{3}{16}$ " thick, sent anywhere prepaid or C.O.D. Also dials and knobs. Write for FREE sample. Ivorylite Radio Panel Company, Dept. Q, 3222 Ave. F., Fort Worth, Texas.

750-WATT TRANSFORMERS 1500 each side. For DEFOREST "H-TUBES" \$15.00. 90-VOLT "B-BATTERY" ELIMINATOR \$18.00. CURTIS-GRIFFITH, FORT WORTH.

Tobe Deutschmann ideal transmitting condensers, —.1 —.5 — 1 — 2 mfd's, 1000 and 2000 volts (tested). Just the right condensers for plate supply filters. New 8-watt tubes, max. pl. volts 800. All parts required for receiving sets and power amplifiers, including chokes, transformers, filter condensers, fixed and variable resistances, and sockets. Get your blueprints giving full construction details of the plate supply units, both for the Raytheon and Thermionic types. Write now for descriptive literature and special Ham prices. Everything sent prepaid. M.B.S. Sales Co., Dept. H.2, 27 School St., Boston, Mass.

SELL: Westinghouse Motor-generator, 1000 volts, 250 milliamperes. Motor: 110 volts, 60 cycles. GUARANTEED! Just from factory. BID. Also other parts. C. Finger, Hudson, N. Y.

OMNIGRAPHES, TRANSMITTING TUBES BOUGHT. SOLD. RYAN RADIO COMPANY, HANNIBAL, MISSOURI.

FOR SALE—20 watt transmitter complete. Tubes, Rectifier, Filter, Transformers, Meters. All in one cabinet \$65.00. Edwin Carlson, Waterman, Illinois.

CERTAINLY! We have all the parts you need for that Raytheon eliminator. Also have few full wave eliminators using two 201A tubes. Bargain while they last \$9.95.

WRAF, THE RADIO CLUB INC., LaPorte, Ind.

Have you received your copy of the new HAMALOG, the Original Ham Catalog, yet? If not, ask for it and we will be glad to send you a free copy. This catalog contains the most complete stock of Amateur transmitting and receiving equipment in the country, some good circuit diagrams and dope on transmitters, receivers, rectifiers, chokes, transformers, B-eliminators, information on getting started in this great game of Amateur transmitting, and on operating Radiotrons at short waves. You can't afford

to be without it. Belongs on your table with QST and Ballantine. A card or letter brings it at once, FREE. Ballantine's "Radio Telephony for Amateurs" \$2.00. Citizen's Call Books, Amateur Section, 75c, broadcast, 50c. Edgewise wound copper strip, 4" inside diameter, 10c per turn, 6", 12c. Beldenmel antenna wire, No. 14, 65c per 100'; No. 12, \$1.00 per 100', postage prepaid to any point, up to 25% of value. UC-1014 Condensers, .002 mfd., \$2.50; UC-490, 1 mfd., 1750 volts, \$2.50. Grid leksa: Ward-Leonard, 5000 ohms, \$2.00; 4000 ohms, 95c; 2500 ohms, 80c. Radioleak, variable, \$5.00. These are just some examples. Also have National condensers, Acme chokes, transformers, and condensers, Thordarson transformers, Pyrex insulators, etc. Discounts to dealers, use your letterhead. E. F. JOHNSON COMPANY, 9ALD, WASECA, MINNESOTA.

TRANSMITTER, receiver, miscellaneous parts for sale. Amos Sorenson, 9CXP, Waseca, Minnesota.

AGENTS WANTED to sell a perfected "B" Battery Eliminator using Radio Corporation Rectron tube, and Trickle Charger using General Electric Tungar bulb at very low prices permitted by eliminating the jobber and dealer. Agents make \$20 to \$50 weekly in spare time. For further information communicate with Peerless Radio Corporation, Newton Lower Falls, Mass.

AMATEURS! DEALERS! Write today for details of UNITROLA EXCLUSIVE DEALER FRANCHISE for the sale of six tube, one control UNITROLA at \$80.00. RADIO ELECTRIC CO., West Winfield, N.Y.

DO YOU WANT TO MEMORIZE THE WIRELESS TELEGRAPH CODE? THE CORYDON SNYDER CODE METHOD IS EASIEST, QUICKEST. PATENTED. Send 25c coin for complete method to Corydon Snyder, 1423 Elmwood Avenue, Chicago, Illinois.

\$2.00 each. Send and Receive, nine Terminal Cann Switches in case (British) Type SES 42. We have \$10,000 worth of United States Government Department Radio Transmitting Receiving Sets and Parts. Get our new and latest reduced price list. Send stamp for list. Mail orders answered all over the world. WELL'S CURIOSITY SHOP, 20 South 2nd St., Philadelphia, Pa.

TRANSFORMERS—CHOKES—Built to your specifications. Write for estimate. O.K. Battery Service, Carthage, Illinois.

THORDARSON 650-VOLT POWER-FILAMENT TRANSFORMERS for 5-WATTERS \$6.90. CURTIS-GRIFFITH, FORT WORTH.

Fifty Watt Broadcasting Station, with key equipment, three fifty watt tubes, thousand volt ESCO, etc. Used less than 200 hours. Specifications on request. Price \$250.00. WBBB, Reading, Pa.

BRASS ribbon for pancake Helices for 20-40-80 meters: $\frac{1}{8}$ " wide, .064" thick, 6c foot, 50 foot lots, 7c foot for less. Prepaid to 5th zone. Geo. Schulz, Calumet, Michigan.

GENERATORS—350w 500v O.K. \$12.50. 200w 500v Rewind \$5.00. 0-10 radiation meter new \$7.50. $\frac{1}{2}$ KW cycle generator \$15.00. Amplifier and 2 tubes \$5.00. 6LC.

ENGRAVER-BRANCH TOOL COMPANY'S, TWO SETS OF MASTERS—COST \$150, SELL \$120. SILVERMARSHALL SUPERHETERODYNE \$30. STANDARD RADIO LABORATORIES, 1083 AILEEN STREET, OAKLAND, CALIFORNIA.

THE LATEST. The Cricket Key. Pie for old hams. Beginners perfect fist in one tenth time. Call or write 5EH.

NEW TYPE EDISON ELEMENT STORAGE "B" BATTERIES ENTIRELY ENCLOSED IN STEEL CASES. REMOVABLE LID. NO HUM OR OTHER NOISES TO HINDER RECEPTION. COMPLETE IN EVERY DETAIL. 100 VOLT TYPE "A" \$12.50. 140 VOLT \$17.00. 100 VOLT TYPE 5-G. 3000 MILLIAMPERE HEAVY DUTY \$19.50. WELDED TYPE "A" ELEMENTS 5c PER PAIR. WELDED 5-G, 6c. HEAVY DUTY TYPE 5-G WELDED ELEMENTS 9c. $\frac{1}{4}$ " x 6" TUBES, 3c. 1 x 6", 4c. NO. 20 PURE NICKEL WIRE, 1c PER FT. NO. 18, $\frac{1}{2}$ c. SEPARATORS, 1/4c. SHEETS $\frac{3}{4}$ " x $\frac{5}{8}$ ", 5c. SEND FOR FULL PRICE LIST AND OTHER INFORMATION. J. ZIED, 904 N. 6th ST., PHILA., PA.

For Sale—One complete broadcasting station formerly KFLB Signal Electric. This set includes two 60 foot steel towers, complete antenna and counterpoise system, motor generator, four 5 watt tubes, three microphones, Thermocoupled 0-10 Amp meter, three stage Magnavox amplifier. The present wattage of this set is 25 watts but can be easily increased. Signal Electric Mfg. Co., Menominee, Michigan.

New $\frac{1}{4}$ Horse 220 V. 60 cycle 3450 Speed motors \$8.50. 110 V. \$9.50, $\frac{1}{2}$ H. P. 220 V. 3450 RPM \$17.50, $\frac{1}{2}$ H. P. 110 V. 3450 RPM \$18.50. Motor Generator Bargains. Robins & Myers 110 V. Generator 350 V. 100 W. \$30.00. Esco 220 V. 60 cycle 3 phase 1750; Generator 400 V. 100 W. \$25.00. 110 V. A.C. 260 V. D.C. \$25.00. 220 V. Direct Current Generator 1500 V. 500 W. \$75.00. All above machines are ring oiled. Also many others, including several 3000 and 4000 V. machines. Write us for prices on anything in motors, generators and motor generators, stating kind of current, voltage, etc. Queen City Electric Co., 1734 Grand Av., Chicago, Ill.

ARE you building a B-Eliminator? Then you will want to use the new Tobe "B" Block which assembles in one single compact unit, one 8; two 2; and two 1 mfd. Tobe filter condensers. We carry all parts required for your B-Eliminator. Everything sent prepaid. Special prices for members of A.R.R.L. on many items. Write now for descriptive literature. M. B. S. Sales Co., Dept. H. 27 School Street, Boston, Mass.

OJO! QUE ESCRIBIMOS ESPANOL. THORDARSON POWER TRANSFORMERS 550 each side \$9.95. SPECIAL POWER-FILAMENT 250-WATT TRANSFORMERS 350-550 each side \$10.50. ALUMINUM square foot 85c; LEAD square foot 85c. JEWELL 0-15 AC VOLTMETERS \$7.50, 0-500 MILLIAMMETERS \$7.50. 5-PLATE CONDENSERS 49c. "HAM-LIST" 4c. SERVICE—THAT'S US. CURTIS-GRIFFITH, 1109 Eighth Avenue, Fort Worth, Texas.

THREE Electrad rectifier jars. 1 jar takes place of 2 ordinary jars with $\frac{1}{4}$ " x $\frac{1}{4}$ " aluminum 99.7% pure, 75c each, plus postage on 2 lbs. 60c each dozen lots plus postage on 15 lbs. Geo. Schulz, Calumet, Michigan.

10 DAY free trial short wave receiver, made of the best parts. Write us for this offer and our other time payment offers. HUDSON RADIO COMPANY, 1416 WYTHE PLACE, NEW YORK CITY.

DON'T spend all your money on one item. We can supply you with the same thing at half the money. Write us for our time payment plan for amateurs. HUDSON RADIO COMPANY, 1416 WYTHE PLACE, NEW YORK CITY.

DO YOU NEED SOMETHING AND HAVEN'T GOT THE MONEY? WE SELL ALL TRANSMITTING PARTS ON TIME PAYMENT. A special offer is made to those who want to buy for cash. Write us before buying anything. Our list contains over 300 items. HUDSON RADIO COMPANY, 1416 WYTHE PLACE, NEW YORK CITY.

BEAT THIS! BRAND NEW. LATEST TYPE RCA UX 210 \$6.95; UV 203A \$32.50. PYREX 7 $\frac{1}{2}$ inch \$1.29. 12 $\frac{1}{2}$ inch \$2.95. 3 inch standoff \$2.39, 7 inch \$2.49. No. 12 enameled wire 100 ft. roll \$1.75. Fleron 8 inch porcelain glazed insulators \$1.45. Cardwell .0005 condensers \$1.25. .001 \$1.95. Double spaced 21 plate transmitting condenser withstand 3000 volt flashover \$3.95. Aero short-wave coils \$10.50. Bremer Tully shortwave outfit \$7.25. Allen Bradley radiostats large \$6.25, small \$3.85. Send for bargain list on Acme transformers and chokes, Thordarson transformers, Jewell meters, R.E.L. transmitting inductances. Hammarlund transmitting and receiving condensers, Bunnell cootie and heavy duty keys, Tobe Deutschmann filter condensers and many others. It pays to deal with AMATEUR RADIO SPECIALTY COMPANY, 77 Cortlandt St., N. Y. C.

THREE THOUSAND foreign calls, including complete British and Canadian lists. The International Amateur Call Book. Every ham needs one. Fifty cents to, The International Call Book Co., Drawer 205, Station "A", Hartford, Connecticut, brings you one.

Jewell Meters, 25% discount. Acme transmitting and receiving apparatus, National transmitting and receiving condensers with type A and B velvet vernier dials. Philco Genuine Nathaniel Baldwin phones and speakers. Philco A and B batteries and battery eliminators. Tobe Deutschmann 2000 volt condensers. 12 and 14 enameled wire. Magnet wire. Bakelite panels, rods and tubing, all sizes.

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Victoreen Super Heterodyne Kits are the last word in supers. Some RCA apparatus left. Bulb type chargers, special. Recticon bulbs. Also Hydrometers, Keys, Buzzers, Omnidographs, Celataste Wire, insulators, amperites, German litz wire, Yaxley and Centralab products. Be sure to get the new National Type B velvet vernier dial. Ward Leonard and Lavite Transmitting Grid Leaks. Double your DX with the new Donle detector tube. Radio Engineering Laboratories short wave transmitting inductances, wave meters and receiving coils. Aero Products, Inc., short wave receiving coils. Cardwell Condensers, Allen-Bradley and General Radio products. Mueller and Telefunken transmitting tubes, sizes from 8 to 250 watt, F B for short waves, plate lead from top of tube. Western Electric, Kellogg and Federal Mikes. Highest quality 120 A. H. storage A batteries \$11.00. No catalogs issued. They are obsolete after 30 days. Tell us what you want and we will send manufacturer's latest descriptive and illustrative literature with list prices and discounts. We allow discounts to A. R. R. L. members and dealers only. Give your call letters. Write us when you need anything. We carry it in stock. Roy C. Stage, Wholesale Radio, Montgomery & Burt Sts., Syracuse, N. Y.

THERMO Galvanometers (5) model 425 Weston 1-115 M A cost \$18.50. As good as new for \$9.00 each while they last. F. B., 1220 Longacre Bldg., New York City.

WAVEMETERS, 10 to 100 meters, two coils, individually calibrated. Accuracy guaranteed within one percent. Excellent construction and handy size, with flash lamp, \$12.50 Postpaid. SHORT WAVE COILS, set of four celluloid supported space-wound plug-in coils with mounting for that new receiver, 18 to 250 meters, \$4.00. We build real amateur equipment and carry the supplies you need. Send for list. Seattle Radio Laboratory, 3335 33rd Ave., South, Seattle, Washington.

Q R A SECTION

50c straight, with copy in following form only: CALL—NAME—ADDRESS. Any other form takes regular HAM-AD rates.

1BV—L. G. Cumming, 83 Marlboro St., Boston, Massachusetts.

1CIO—Philip T. Brown, 15 Bramhall St., Portland, Maine.

1CKM—C. D. Moir, Box 121, Shrewsbury, Mass.

1FB—L. G. Cumming, Prout's Neck, Maine.

1GJ—H. D. Holt, 78 Glenville Ave., Allston, Mass.

1RD—J. Raymond Decker, 212 Winslow Road, Waban, Mass.

1ZA—C. E. Jeffrey, Jr., 725 Commonwealth Ave., Newton Center, Massachusetts.

2ATM—John B. Trevor, Jr., 11 East 91st St., New York City.

2ATX—E. Dillmeier, Jr., 8408 114th St., Richmond Hill, Long Island, N. Y.

2AVP—Ex 2AHI, Maurice Grayle Suffern, 607 West Beach Street, Long Beach, L. I., N. Y.

2AWN—E. Dillmeier, Jr., 125 S. Clinton Ave., Bayshore, Long Island, N. Y.

2AXS—Paul R. Leonard, 8 Worrall Ave., Poughkeepsie, N. Y.

2CHK—Harold Sachs, 161 West 75th Street, New York City.

2MK—E. F. Raynolds, Central Valley, Orange Co., New York.

2PX—F. V. Broady, 35 Wagner Ave., Schenectady, N. Y.

2QB—John M. Avery, 131 South 29th St., Flushing, N. Y.

3AIR—Fernand Causse, Box 81, Lester, Penna.

3AKD—Roger Causse, Box 81, Lester, Penna.

4CZ—Clarence L. Durham, Box 550 Hendersonville, N. C.

5GO—R. Painter, 736 Lillian Ave., S. W., Atlanta, Georgia.

5AQ—H. H. Green, 6119 Bryan Parkway, Dallas, Texas.

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6ASS—Garland Swain, Rivera, California.

8ALU—J. A. Carnes, M.D., 811 Plum St., Massillon, Ohio.

8BHM—Rob-Roy Phillips, Box 231, Hornell, New York.

8CWT—Quentin D. Bellas, 402 Armstrong Ave., Apollo, Pennsylvania.

8DOY—H. C. Morrison, 333 Rohrer St., Greensburg, Pennsylvania.

8DSQ—C. A. Gillilan, Box 23, Carbondale, Ohio.

9ADZ—Henry M. Licht, 514 Powell St., Streator, Illinois.

9ARA—Robert Henry, Butler, Missouri.

9AVM—Leslie E. Jaucke, Junction City, Kansas, R. 1.

9BCQ—Ben Plunkett, Butler, Missouri.

9BGL—L. C. Campbell, Miller, So. Dakota.

9BUB—J. J. Pickhardt, 10th and Clay Sts., Jasper, Indiana.

9CDF—Heber King, Butler, Missouri.

9COR—Howard Lowen, 210 So. Chautauqua, Wichita, Kansas.

9CRX—Harry A. Douglas (& Geo. Waddell), West Liberty, Illinois.

9CVY—Walter Henry, Jr., Butler, Missouri.

9CWZ—John McNay, Butler, Missouri.

9DCG—Roland B. Cooper, 326 Nicholas St., Vincennes, Indiana.

9EAI—Lyle F. White, 523 S. Washington Ave., Kankakee, Illinois.

9EBY—C. C. Rhodes, Butler, Missouri.

BZ6QA (ex 7AA)—A. A. Santos, Box 53, Maranhao, Brazil, S. A.

The following stations belong to members of the A.R.R.L. Headquarters gang. Mail for them should be addressed care A.R.R.L., Hartford, Conn.
 1MK Headquarters IES A. A. Hebert
 1AL H. P. Westman 1KP F. Cheyney Beekley
 1BAO R. S. Kruse 1MO Dorothy E. Menk
 1BDI F. E. Handy 1OA R. S. Kruse
 1BHW K. B. Warner 1SZ C. C. Rodimon
 1DQ John M. Clayton IXAQ R. S. Kruse

A PIONEER RADIO SCHOOL With a Record of Successful Graduates

This school was started back in the days of the ten inch spark coil. Radio has advanced and so have we. Completely equipped with Spark-Arc—Vacuum Tube Transmitters, and Automatic Code Machines. Send for Booklet, "Opportunities in Radio."

Y. M. C. A. RADIO INSTITUTE
159 East 86th Street, New York, N. Y.

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Prize contest

\$25

for five
words

First Prize:

Magnavox R3 or
M3 Loud Speaker;
value \$25.00.

Second Prize:

Set of 5 Magnavox
Tubes; value
\$12.50.



WE want a slogan to sum up the superiorities of the new Magnavox non-microphonic tubes. Perhaps you have used these tubes and have found some unusual feature. If so, put it in words and you may win a prize. If you don't know the Magnavox Tube, borrow one from a friend, read the following, ask the Magnavox dealer or write to us for full information.

The Magnavox Tube is ideal for short wave reception as its internal capacity is only 4.5 MMF. It oscillates freely on low wave lengths without unbasing. Its amplification constant is very high, with low impedance. It is equally dependable for detecting or amplifying. It is backed by 15 years of radio manufacturing experience.

Rules of Contest:

1. Slogan must be non-technical —easy for laymen to grasp.
2. Must not be more than three to five words.
3. Contest closes June 15th. Announcement of winners will be made in QST, August issue.
4. The Magnavox Company will be sole judges.

Start right now to win one of these prizes.
Address entries "Magnavox Contest."

THE MAGNAVOX COMPANY
OAKLAND, CALIFORNIA

24D10

In the Radio Business Since 1911

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—FOR YOUR CONVENIENCE—

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SAY YOU SAW IT IN QST—IT IDENTIFIES YOU AND HELPS QST



*"I've just had a lesson in
radio economy, and, believe me,
it's illuminating"*

"I WENT into my radio dealer's this noon for a couple of 'B' batteries and said, 'Tom, give me a pair of Eveready 45-volt 'B' Batteries, No. 772's.'

"How many tubes in your set, Jim?" he asked.

"Five," I answered.

"Then what you want is a pair of Heavy Duty Evereadys—the Layerbilt No. 486's."

"Why?" I asked.

"Because the Eveready 772's are meant for one to three tubes. With average use of two hours a day, and used with a "C" battery*, they should last a year or longer. But on a five-tube set, with average use and with a "C" battery, they will only last about four months. Anyone with a four or five tube set should buy a pair of Eveready Layerbilts No. 486. Used two hours a day and with a "C" battery they should last eight months or longer."

"Yes, but the 772's cost only \$3.75 each," I said, "and the Layerbilt \$5.50."

"Well, figure it out," said Tom. "Two sets of 772's should last you about eight

months, and will cost you \$15.00. One set of Eveready Layerbilts should last about eight months, and will cost you only \$11.00!"

The simple rules for this satisfaction and economy are:

On 1 to 3 tubes—Use Eveready No. 772.

On 4 or more tubes—Use the Heavy Duty "B" Batteries, either No. 770, or the even longer-lived Eveready Layerbilt No. 486.

On all but single tube sets—Use a "C" battery.

When following these rules, the No. 772, on 1 to 3 tube sets, will last for a year or more; and the Heavy Duties, on sets of 4 or more tubes, for eight months or longer.

* NOTE — A "C" battery greatly increases the life of your "B" batteries and gives a quality of reception unobtainable without it. Radio sets may easily be changed by any competent radio service man to permit the use of a "C" Battery.

Manufactured and guaranteed by
NATIONAL CARBON CO., Inc.
New York San Francisco
Canadian National Carbon Co.,
Limited, Toronto, Ontario



SAY YOU SAW IT IN QST—it identifies you and helps QST

Tuesday night means Eveready Hour
—8 P. M., Eastern Standard Time,
through the following stations:
WEAF-New York WBAL-Cincinnati
WJAR-Providence WTAM-Cleveland
WEEL-Boston WWS-Detroit
WTAG-Worcester WGN-Chicago
WFN-Philadelphia WOO-Davenport
WGR-Buffalo WCOO-Minneapolis
WCAE-Pittsburgh KSD-St. Louis

in radio little micadons make a big difference



MICADON 640
An improved design making
possible a wider range of
capacities.



MICADON 601
The standard fixed condenser
of radio

MICADON 640A
Compactly made for use in resist-
ance coupled amplifiers.

THERE doesn't seem to be much to a Micadon when you look at it. The infinite care that is given to every detail in the manufacture of Dubilier Micadons is your assurance that they will always do their job.

Micadons are a small item in the cost of any radio set. But the difference between clear and poor reception, and the change from noise to natural tones may often depend upon their use.

*Send 10c for our booklet which shows fourteen
ways in which you can improve your set by simple
application of fixed condensers.*

4377 Bronx Blvd., New York

Dubilier

CONDENSER AND RADIO CORPORATION

The Communications Department

F. E. Handy, Communications Manager
1711 Park St., Hartford, Conn.



Notice!

ALL A.R.R.L. members of the Northwestern, Dakota, Hudson, and Maritime Divisions!

The Sectionalizing of territory in the Divisions named is indicated as follows:

Northwestern Division (five sections): Washington, Oregon, Montana, Idaho, and Alaska.

Dakota Division (four sections).

North Dakota, South Dakota, Northern Minnesota (including all counties north of the Minnesota River and north and east of that part of the Mississippi River between the mouths of the Minnesota and St. Croix rivers), Southern Minnesota (including all counties south of the Minnesota River and south of that section of the Mississippi River between the mouths of the Minnesota and St. Croix rivers and in addition the county of Hennepin).

Hudson Division (three sections):

Northern New Jersey (all of New Jersey within the Second Federal Inspection District), New York City and all of Long Island, Eastern New York (all of New York state within the Second Federal Inspection District excepting Long Island and New York City).

Maritime Division (four sections):

Province of New Brunswick, Prince Edward Island, Nova Scotia, and the Dominion of New Foundland.

Nominating petitions are hereby solicited Five or more A.R.R.L. members in good standing have the privilege of nominating any League members in their Section as candidate for Section Communications Manager. The election will take place in July and August on ballots which will be mailed from League Headquarters.

A form for nomination was shown on page 45 of April 1926 *QST*. Such petitions must be filed at A. R. R. L. Headquarters, Hartford, Conn. by noon of the 15th day of July, 1926. There is no limit to the number of petitions that may be filed but no member shall sign more than one such petition. April *QST* fully explains the change in organization will continue in force until the As previously announced, the present organizations will continue in force until the Section Communications Managers have been elected. Members are urged to take the initiative and file nominating petitions immediately.

—F. E. Handy, Communications Manager.

QST FOR JUNE, 1926

Further Notes on Checking Messages by Cable Count

CORRECT your May *QST* at the top of the second column, page 40, to read, "IMR counts as three words in the signature or text of a message."

The name of a state that has two parts is always counted as one in the address. It is usually counted as two in the text but may count as either one or two depending entirely on how it is written and transmitted. Example: If written, "NEW YORK" in the text, it is counted as two words. If written, "NEWYORK" it is counted as one word.

It is customary at shore stations handling General Public Service Messages to omit the count of the name of a state in the check when it is included in parenthesis in the address. If New Jersey is transmitted with a parenthesis (KK, ——) before and after it, it indicates that the word has not been counted in the check.

In code messages, no word containing more than ten characters is accepted.

When messages are written in plain language, code, and cipher, the passages in plain language and code are counted as code ten letter count and the passages in cipher take the five letter count.

When messages are written in plain language and cipher, the passages in plain language take the fifteen letter count and the passages in cipher take the five letter count.

When messages are written in plain language and code, the entire message takes the ten letter count.

When the letters "ch" come together in the forming of a dictionary word, they are counted as one letter. In artificial words the combination is counted as two letters.

Don't forget that in checking messages using Cable Count, the words in address, text, and signature are counted.

C. O. S. of WFK-SLA + F. E. H.

The Atlantic Coast QSR Line

By "MP" of 8DHX

IT will be of great interest to the traffic men of the A.R.R.L. to learn of the existence of a complete "sure fire" relay system covering the entire Atlantic Coast. It includes, at present, no less than twenty-nine traffic moving stations. Its completeness can be seen at a glance at the accompanying map.

This "sure fire" net has been, with some modifications, in actual nightly operation for a half year's time. Included in it are some of the biggest and fastest Official Relay Stations of the East. No message, when once started in the net, ever gets stale. Delivery is guaranteed for any city within the net.

Maine and foreign traffic is routed to 1ATJ who ties the Atlantic Coast Line and the Maine Message Pusher's Club* net together. Traffic for Canada is routed via 8EU and 8GI. Far West messages go via 8CNX. 8DHX clears all New York State traffic including a great deal of that to New York City. The "hub" of the system, 3BWT, clears all south bound messages via 4JR and 4MV.

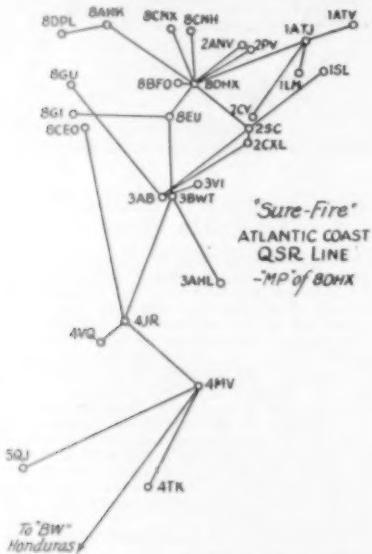
The amount of traffic handled can be judged by noting the brass pounders included, some of whom are runners up for the Traffic Trophy—namely 8EU, 8DHX and 1ATJ.

There is room for real traffic stations and schedules are needed in several places yet. A number of the members of the Atlantic Coast Line traffic system are lining up nets of stations in their states to efficiently dispose of the North-South state traffic which is handled over the trunk route. More dope

* See "A New Idea"—page V, Communications Dep't., May 1926 *QST*, Vol. X, No. 8.

is available from either 3BWT or 8DHX for anyone wishing to join the system.

It seems to the writer that a system for Trans-Continental Relaying and for work along the West Coast can be developed along similar lines and be



of great value to the A.R.R.L. Then "Chuck" of 8CNY wouldn't be jammed every night with a score of west coast messages. Hi!

What say gang? Shall we have a Trans-Continental route to join to the present Atlantic Coast net? Stations and operators who can keep schedules, who want real traffic and plenty of it, who know how to handle a key efficiently are needed. If you are one such, join the chain without delay! QST will follow the progress of the work and give credit where it belongs. A.R.R.L. men everywhere are behind the idea.

Army-Amateur Notes

2 ND CORPS AREA—Radio Nets have been organized for the New Jersey National Guard, 77th, 78th and 98th Divisions, Organized Reserves. These nets are functioning, but not complete. From time to time additional amateurs will be assigned. The work in this Area is progressing very satisfactorily. The only trouble encountered to date is the lack of coordination between each amateur and the officer of the unit to which he must report for traffic. The officers of various military units have not had opportunity to become familiar with the plan, or versed in Army traffic handling, but progress in these matters is being made. It is suggested that all Army amateurs be well versed in this plan and the possibilities for handling that traffic and offer suggestions or advice to their units when called upon.

The National Guard net for Delaware has not been organized, lacking amateurs in the proper localities. 6 amateurs are needed for Wilmington, 2 for Delaware City and 2 for Laurel.

The organization of the National Guard of New York State is held up pending information from that organization. The following amateurs have been appointed and certificates mailed: 3jw 2cvf 3agd 2aoe 2ka 3an 2wr 3vx 2qzg 3bt 2pe 2crp 2bs 2dx 2ad 2ll 2ka 2ro 2ax 2al 2at 3xan 8ai 8bpnm 8kw 8dsi 2ro 2ab 2kr 2ao 8qj 2awf 8hr 2pv 2aua.

3RD CORPS AREA—Tests were conducted throughout April with the amateurs of the Third Corps Area taking part in the Army-Amateur plan. Signal Corps Station 2en at Fort Howard, Md., is the station designated for the purpose.

Each amateur has been assigned a time and wavelength on which to call 3nn. Tests have been arranged in mornings, afternoons, and late at nights. 3nn transmits on 3945 Kc's at all times so that stations worked have no difficulty due to a shifting wavelength. The amateurs are all enthusiastic and cooperate to the fullest extent possible.

At the conclusion of the tests, the stations needed

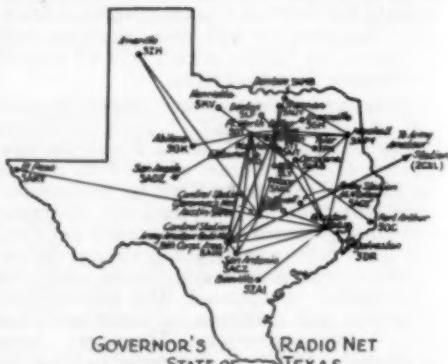
will be designated, and certificates will be issued by the Signal Officer, 3rd Corps Area. When the Net begins functioning, only those amateurs who have demonstrated their ability to Signal Corps officials will be found operating stations therein. These tests are open to other amateurs within Pennsylvania, Maryland, Virginia and the District of Columbia, who may wish to affiliate with the Signal Corps. Upon application, the Signal Officer, Hq, Third Corps Area, Baltimore, Md., will be glad to arrange tests.

5TH CORPS AREA—The Net has been on a regular schedule for two months, working every Saturday at 2:00 pm, Eastern Standard Time, on 40 meters. Traffic has been handled in a prompt and satisfactory manner. The 83rd, 84th and 100th Divisions, Organized Reserves, are rapidly filling up their Divisional Nets. Certificates have been mailed to the following stations: Sam 8egh Saa 8ga 9byl 9esc 9dhj 9abp 9ebw 9aqf 9dipj 9cyr 9ejr 9adk.

6TH CORPS AREA—Considerable progress has been made this month. The Corps net is nearly completed. The Organized Reserve net is being built up as fast as reliable stations are made available. More amateur stations are needed in Michigan at Marquette, Sault Ste. Marie, Escanaba, Muskegon, Grand Rapids, Lansing, Jackson and Flint; in Wisconsin at Stanley, Wausau, Oconto, Madison, Sparta and Janesville; in Illinois at Rockford, Sterling, LaSalle, Pontiac, East St. Louis, Ottawa, Aurora, Joliet, Peoria, Springfield, Bloomington, Urbana, Taylorville and Centralia. Interested stations able to handle traffic in the Army Amateur Net in the above towns should write Signal Officer, Sixth Corps Area, 1819 West Pershing Road, Chicago, Illinois, for particulars. Those chosen will receive a certificate authorizing them to handle army traffic. Messages are now being handled over that much of the Net already organized and those doing the work find it interesting and instructive.

7TH CORPS AREA—The Governor's net in Minnesota having been completed, a test was conducted by the Signal Officer, on April 10. A message originating at Omaha addressed to the Commanding Officer of National Guard organizations at Dawson, (9edf); Luverne (9bfn); Kenneth (9egz); Crookston (9dkr); New Ulm (9bzx); St. Cloud (9eof); Rochester (9eo); Redwood Falls (9af); Ortonville (9dji); Mankato (9btz); Stillwater (9elc) was filed with Mr. Diehl, Assistant to the Manager, Midwest Division, A.R.R.L. at the Corps Headquarters control station, Omaha, Nebraska, Saturday, April 10, 10:35 AM. This test message was sent by Mr. Diehl to the Governor's control station 9bay, St. Paul, and promptly relayed by Mr. McCord to destination on Sunday, April 11 at 8:00 PM. While replies from addressees were not received with expected promptness, the test was highly satisfactory insofar as the net itself is concerned. The test demonstrated that the Minnesota net is thoroughly organized, and that traffic can be handled with speed and accuracy.

8TH CORPS AREA—The Governor's net in Texas is shown by the diagram. It operates on 40 meters between 6:30 and 7:30 pm, daily except Sunday. Sixty-four operators have been issued certificates of appointment and assigned various National Guard Units in 29 cities and towns. Test messages have been exchanged between net control station 5ain (Fort Sam Houston) and practically all stations in the net. The enthusiasm is all that could be asked.



When three broadcasts were sent recently, over 80% of the appointed stations reported.

A similar net in Oklahoma is now in the process of organization. It is expected to become operative

May 1st after which nets in Colorado, Arizona and New Mexico will be organized.

9TH CORPS AREA—A number of assignments of amateur stations were made by the A.R.R.L. representative during the month. Certificates will be issued during April. Considerable difficulty is being experienced in securing stations at some points where important National Guard units are located. As an example, it has been found that there are no licensed amateur stations at Cheyenne, Wyoming, and the whole state of Wyoming is practically without a station.

Army-Amateur Notes follow the progress of this important amateur work from month to month. The general plan was given on page 22 of October 1925 QST. Appointment certificates are being issued to the amateurs selected just as fast as the applications and information from Army units can be put together. Stations that offer their services must first be designated to serve specific National Guard or Organized Reserve units.

Some interesting things have been planned for the work of the coming season. You will want to get a chance to take part in it. Better send in your application today, OM. Get lined up while the opportunity still holds good and there are some blank positions to be filled.

A.R.R.L. Representatives in the Army-Amateur Communication system have been appointed for each Corps Area. Applications from amateurs residing in the different Corps Areas are referred to the proper Representative. If you do not know in what Corps Area you are located, write A.R.R.L. Headquarters and we will see that your letter is forwarded correctly. If you do know in which of the nine Corps Areas you are located, you can send your application to your Corps Area representative:

Corps Area	Call Name	Address
First	1ZW P. K. Baldwin	899 Boylston St., Boston, Mass.
Second	2PF David Talley	2222 Avenue O., Brooklyn, N. Y.
Third	3WF Chas. A. Miller	405 N. Curley St., E. Baltimore, Md.
Fourth	4IO J. Morris	58 Frederica St., Atlanta, Ga.
Fifth	5BY H. C. Storck	69 Carpenter St., Columbus, Ohio
Sixth	9AAW W. E. Schweitzer	4264 Hazel Ave., Chicago, Ill.
(Acting)	9AFF W. W. Bingham	2424 West Munroe St (Chicago, Ill.)
Seventh	9DXY P. H. Quinby	Box 134A, Rt. 6, Omaha, Nebr.
Eighth	5ZAE L. D. Wall	316 Callaghan Ave., San Antonio, Tex.
Ninth	cZAD A. H. Babcock	65 Market St., San Francisco, Calif.

OFFICIAL BROADCASTING STATIONS

Changes and Additions

Local Standard Time	Days of Trans-mission	Days of week
7.00 pm 10.30 pm	12.30 pm	Tues. Thurs. Sat.
6AIH 40-80	—	—
6ANO 40	40	Mon. Wed. Fri.
6BUC —	40.25	—
6NX***	—	Mon. Wed. Fri.
8BSU*****	30	Mon. Fri.
9DZR 80	—	Fri. Sat.
WJBA —	206.8	Mon. (voice)
cIBZ**	—	Sat.
cIDD 52.5	—	Sat.
cIEI 52.5	—	Sat.
c8AR***	—	Sat.
* 7.30 pm	52.5 meters.	
** 52.5 meters	12 pm.	
*** 46 meters,	6:30 pm.	
**** 8 pm.	39 meters.	
***** 9 pm.	39 meters.	same days.

Traffic Briefs

THE Chicago Daily News—C.R.T.A. message service is rounding out nicely. The traffic committee hold weekly meetings. A lot of work is being done on message organization. The problem of better relaying is also receiving proper attention. The arranging of schedules and strict use of A.R.R.L.

standard practice helps in this. The traffic committee has undertaken to give a special message service to six hotels and hospitals in the Chicago district. Thanks is due to the Chicago Daily News for preparing two kinds of message blanks for collecting and delivering the radio messages.

The membership of the Maine Message Pushers Club is now as follows: 1KL, 1ATV, 1AUF, 1AQL, 1UU, 1BFZ, 1BTQ, 1AWQ, 1AYJ, 1ADI, 1AAV, 1SO, 1CSY, 1BNL, 1CIB, 1BUB, 1AH and 1BIG. 8AHK is going ahead with the organization of a message-pushing network in Western New York. 1KY intends to form a club of traffic handlers in Eastern Massachusetts. Look at the Maine fellows who rated the Brass Pounders' League this month? Then start something with your local gang.

5WK has the right idea. His QSL card tells the usual things about transmitter and receiver and in addition it is a get-acquainted card. It tells a lot about himself. 1ATV uses some stationery printed along similar lines. If your cards don't seem to bring replies it may be that they lack a personal friendly touch. When you make up some new ones for the printer bear 5WK's suggestion in mind.

Mr. Leon C. Grove writes from Nenana, Alaska, that he keeps a daily schedule with 6HJ. He requests that all traffic for interior Alaska be routed through 6HJ. 7GZ and 7SM have been in regular touch with the Wilkins Arctic Expedition ever since the start from Nenana. 7GZ assisted materially in maintaining contact with KFZH. 7SM (Mr. Grove) handled a bunch of messages during April.

c3CK has a bunch of schedules with Canadian stations on 52.51 meters. He reports that during a big storm the last of March, several Canadian stations were kept busy handling the emergency traffic that resulted as the result of the storm. Official messages were handled for the Marconi Company and also for the Ontario Hydroelectric Company, c3FC sent a lot of press to Ottawa and Port Arthur and was in constant touch with Toronto. Besides this there were many messages for private individuals transmitted. Everyone made good use of our A.R.R.L. service.

KFUH and 6HV bat them out in fine style. 200 word messages are not uncommon. All the San Jose boys can hold up their end with the key. Listen to 'em!

5AKT suggests using mimeographed government postal cards for temporary or portable stations. He says this procedure cuts down excessive printing rates on small lots.

6SV, the Santa Clara County Radio Association, has just concluded a five day test at Mt. Hamilton, Lick Observatory. The results were wonderful. One of the features of the tests was just an ordinary thing to the amateurs concerned but made a great impression on the Director of the Lick Observatory. A 75-word technical message directed to "Observatorio Astronomico, Santiago, Chile," was given to ch2LD and promptly delivered. We guess the observatories all over the world could make good use of amateur radio, if they got in touch with their local "hams."

NKF still has a transmitter right on 8010 Ke's—(slightly below 37.5 meters)—marking the lower edge of the amateur 40-meter band. 8DAJ operates squarely on the upper edge of the same band. FW on 7139 Ke's is also near the upper edge of the band. Any of these stations can be logged on the receiver and used in checking the wavemeter. There is no excuse for operating off-wave and amateurs who find their licenses suspended or revoked by the Department of Commerce have only themselves to blame.

9ZA casually mentions working KFUH and zIAO. Yes, it was two-way break-in, at 30 words per minute! That's real sport!

8ZG, 8PL, 9ZA, 3ZO and 3AUU have worked five-way break-in many times. All are right on zero-beat talking in order. There are no unnecessary calls, no signs necessary during the conversation, and perfect contact. 9ZA gets on about 5:30, says, "dah-h-h, go 9za." 8GX comes back with, "ge FJ hr Windy" and they're off! What think of

that, you chaps who say it's necessary to call thirty times to raise 'em?

After trying to handle messages with some "punk" who repeated each word four times after calling you fifty times and giving you r9, it was a pleasure to work or even listen to a snappy, efficient operator.

IAAV writes in to point out the value of brevity to the traffic-handler. He is one of the MMPC operators who believes in cutting down on unnecessary transmission. "R K" or "57 R" is all that is necessary to acknowledge a message when there is no QRM. Sending speed is of secondary consideration to good operating form and accuracy. A sizeable amount of traffic can be handled in a very short time if the man at the sending end is brief and the receiving "op" has his wife about him.

Try to make your operating snappy and brief, OMAs. Don't get a "bug" thinking that will solve the problem wholly. Study the way it is done, practice with a buxer or audio oscillator a bit, and then try the standard abbreviated procedures on the air.

In the Fifth Corps Areas the Army-Amateur Stations are using AA in a similar way to that in which PRR has been used for railroad emergency work. If you hear a "CQ AA" it is simply the general call for Army-Amateur work.

2ADH always listens for at least 5 minutes following a general CQ. Every other good station should follow the same policy (we were surprised on logging a number that didn't). There is no excuse for calling a foreign station just because one happens to be heard while listening for answers to a CQ. A suitable time for stations to call you should be occupied with an earnest hunt for signals all over the dial. Let's try to cultivate the same courtesy shown by our foreign amateur friends. We shall be richly repaid.

Club Activities

CONNECTICUT—The Grid and Plate Association of Stamford, held their first annual banquet and get-together April 17. The ADM and many amateurs from neighboring cities attended. The affair was most successful and the enthusiasm shown speaks a bright future for the club. IBM, 1IV, IBGC, 1CTL, IBWM, 1ABN, 1BGQ, 1BEZ, 1AXN, 1AOJ, 1CJJ, and 1IVY were among those present. 1BEZ was toast-master. ADM Nichols was the principal speaker.

ILLINOIS—The LaGrange Radio Club had a hamfest Sunday, April 11. The guests were 9DD5, 9BNQ, 9ELR, 9ELP, 9BZH, 9KC, 9GE, 9QD and 9APY. 8BEH from Holland, Michigan was present. 9CYS, 9CWL, 9DLB and 9AVZ were among the stations visited.

The Chicago Radio Traffic Association was favored with a talk on club organization by Mr. Pease, KC, at the last meeting.

A general meeting of amateurs of Chicago and its outlying districts was held at 9BWM, Joliet, Illinois on May 9. The formation of a state traffic-handling net was discussed and we hope to include a further report on the action taken in these columns.

MANITOBA—At the April 18 meeting of the Winnipeg Radio Traffic Association plans for the second annual Prairie Division Convention were made. 4DE spoke on the construction of power transformers. The usual buzzer practice ended the meeting. On April 27th, there was one of the biggest gatherings of Winnipeg amateurs held. A good time was had by every amateur attending the WRTA banquet. All live hams are urged to get in touch with Secretary Paterson, c4DY, and to attend the meetings.

MASSACHUSETTS—The first meeting of the Radio Club of Melrose was held May 4. The 10 watt station of the Melrose National Guard will be used by club members. Lieut. Talbot and Lieut. Brown of the National Guard gave fine talks at this meeting. Meetings are held in City Hall the first Monday in each month. Mr. Cutting, 1APK, is President, Mr. Graham, 1ARS, is Secretary-Treasurer and Mr. G. Shaw 1IN, is Vice-President. 1FF was temporary chairman. All amateurs and professional radio men of the vicinity are invited to join. The dues are low and the initiation FB.

NEBRASKA—The local club at Omaha are taking steps to boost traffic work in the state. Division Manager Quinby is chairman of the traffic committee. The amount of traffic originated locally is being increased by placing numerous message blanks and

mail-boxes with explanatory placards in conspicuous places about town at the disposal of the public.

NEW JERSEY—The Amateur Radio Association of Essex County have over 30 licensed "ops" as members. The club has four message boxes in various hotels in Newark and have two alternate collectors every other night so each operator gets his share of traffic. 2KA, 2ZB, and 2KS are Army-Amateur stations. All the operators follow ARRL standard practice in respect to Communications Department matters. The youngest operator in this live club is 14 years old, the oldest 57.

The Eclipse Radio Club organized about one year ago, has progressed well. The Club Headquarters were obtained through 8SU (now 2QD). A "shack" was purchased ten miles from its present site and brought to Orange where the rebuilding and refinishing was carried out by club members. A few months ago, the first anniversary dinner was held and Treasurer A. Hebert of ARRL Headquarters gave a very enlightening talk that was enjoyed by all.

OHIO—The Ashtabula Radio Club are busy with the usual activities. They are trying to locate some illegal transmitters in the city and bring them to justice.

The Cleveland Amateur Radio Association had an interesting talk by Mr. Hebert of A.R.R.L. Headquarters who stopped off on his way to the Kalamazoo Convention.

SDQ, the station of the Norwalk Amateur Radio Association, continues to operate with a slight falling off in message handling due to the warmer weather.

The Findlay Radio Club have started the erection of a Club House where the club station will be located next winter (8FT).

The Mahoning Valley Amateur Radio Club of McKinley Heights has just completed a new club station. A 50 watt MO-PA set with 1000 volt B-battery supply will be used. The station is half way between the two cities on the Youngstown-Warren Road.

PENNSYLVANIA—The regular monthly meeting of the Lehigh Valley ORS Club was held in the shack of 8CTZ, Palmerton, Pa. April 12. There was nearly 100% attendance from Dist. No. 2, Pennsylvania. Routine business was handled and better operating practice was discussed.

The Amateur Transmitters' Association of Western Pennsylvania had a fine turnout at their hamfest March 12. We are reproducing the excellent prospectus that the Association distributed before the meeting was held. It is a good example for any club and the folks who got it up are to be congratulated. There were talks by A.D.M. Wiggin, MacAulay, Young, and Buzzard. Then Coleman spent the rest of the evening with a talk on Hertz antennae and quartz crystals. With the good feed and raw-chew, the meeting was a tremendous success from every standpoint.

Funny Letters

Hams—

Braspoonders—

Radio Bugs!

Funny card reading QRM cutting, boy chasers. You

forget that at up one the one

and the other is the one

calling Autors and that regular CQ. You have both

the most roses—roses and

the rough diamonds. Have a

smile and a good time and

like a lot. Turn the page—

read on.



Funny Dogs

After a year there will be

the old hamster and the one

he has just adopted. In the

mean time there will be

plenty of opportunity to discuss

each other's past and present

actions and to tell each other

about the other's past and present

actions together. And in this day

of rapid change it is necessary



that you pull together the

things that are now easy

done and that you will

be forced to others throughout

the western part of the state

There will be no change made

in the running of the show or

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Funny Letters

Playing such excellent work

most stations would

be well to bring along

any suitcase that may be per-

sonal to you.



In addition to the telephone

R.C. Hobbies, 8CTZ, and the New Kensington gang

will be here to help you with a

little extra.

You will remember

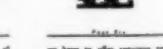
that 8CTZ was the home of the

newspaper and general store

that was pulled or a hamlet at

New Kensington a few years ago.

Whenever they offer will be good



We have to offer ourselves you

that you want to sign up

it will be possible to do so

at the next meeting.

The next one will not yet

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A number of Vigilance Committees are clearing up interference cases in the Pittsburgh area. The Pittsburgh Chronical-Telegraph and A. D. M. Wiggin are responsible for the good work that is being done.

VIRGINIA—The Richmond Short Wave Club was organized formally April 24. The early work will be on 40 meters 3BMN, 3CEL, 3NG, 3AJR, 3AEV, 3AIK, WBBL and a dozen other "ops" were present. Mr. Gordon Hammond was elected President and Mr. R. N. Eubank, Sec'y-Treas. The club meets twice each month at the Y. M. C. A. and interesting meetings are planned for the coming season.

WISCONSIN—The Milwaukee Radio Amateurs' Club have a new stunt that is useful in boosting attendance. Every member who arrives on time is given a chance at a raffle. The prizes are receiving tubes donated by the operating staff of 9DTK. The Club has taken a firm stand against untruthful radio advertising and reports it that results are shown already in Milwaukee. Professor Wood of the U. of W. Extension Division gave an interesting talk. Mr. Burton F. Miller, chief operator of 9XM-9DW at the University also spoke on crystal control and short wave radiophones.

TRAFFIC SUMMARY BY STATES

DURING March-April, there was a slight increase in the total amount of traffic handled, probably due to the increasing number of traffic networks in different parts of the country. Delivery figures remain about the same as before.

The percentage of all the Official Relay Stations under each officer and the percent of TOTAL messages handled by each section are included in the summary of this month's work. By comparing each column showing these percentage figures the standing of each section is shown on a message-handling and reporting basis. If the percentage shown opposite your name under "%ORS" is greater than shown under "%MSGS" it means that some of the following things need to be done: (1) Dead O. R. S. need to be cancelled. More live stations need to be appointed. (2) Message lanes need to be formed covering your territory. More schedules may help. Perhaps the fellows needs to be urged to originate more messages. (3) Maybe the messages are being handled all right after all but the reports are not coming in as they should—which means that some letters need to be written.

The different Assistant Division Managers are listed below. Are you doing your part to keep your State and Division a leader? How will you stand next month?

If every station owner who reads these words will see that every message he handles is delivered or passed along promptly and report his good work, we will be able to show 100% delivery in the National scheme of things in a short time!

The problem of message RELAYING and DELIVERY must get some serious attention if our general service is to be one of which we are proud. The reports show that messages going over regularly scheduled routes get through with the desired speed and 100% accuracy. The figures show that there is plenty of traffic to be handled. More individual responsibility regarding prompt relaying and delivery will bring the results we want.

Messages received should always be delivered immediately (a) by telephone, (b) in person, or (c) by mail if no other means of effecting delivery are available.

Never accept messages which cannot be handled or delivered without informing the chap filing the message of the circumstances.

Keep the hook clear by handling traffic on schedule daily.

ATLANTIC DIVISION

State or Division	ADM	% ORS	% MSGS	Mgrs	Offic	Rel. D	Total
D. of C.	A. B. Goodall	.46	.123	59	46	301	306
Md.	G. L. Detleffson	.871	.41	10	24	71	104
So. N. J.	H. W. Denham	1.39	—	—	—	—	—
W. N. Y.	C. S. Taylor	.965	4.32	307	144	653	1072
East. Pa.	J. F. Rau	2.5	4.33	114	85	481	1074
West. Pa.	P. E. Wiggin	3.9	3.16	127	160	651	937
Del.	H. H. Layton	.174	—	—	—	—	—
		13.3	9.05	617	459	2037	3493

CENTRAL DIVISION

Mich.	F. D. Fallain	8.00	.527	35	37	51	131
Ohio		5.74	4.82	127	90	441	781
Ill.	W. E. Schweitzer	4.87	7.36	506	342	996	1824
Wis.	C. N. Crapo	2.66	3.76	429	288	714	1431
Ind.	D. J. Angus	2.54	3.20	77	42	366	818
Ky.	J. C. Anderson	.93	—	—	—	—	—

19.8 21.66 1168 799 2568 4935

DAKOTA DIVISION							
Minn.	C. L. Barker	4.5	5.20	306	229	756	1288
No. Dak.	M. J. Junkins	1.45	1.24	36	24	272	333
No. Dak.	G. H. Moir	.093	.10	12	7	53	56

6.9 6.64 254 280 1063 1877

DELTA DIVISION							
Miss.	J. W. Gullett	.297	.137	18	—	18	34
Ark.	L. M. Hunter	.25	.137	8	—	25	34
Tenn.	L. K. Rush	.058	.172	19	4	18	43
La.	C. A. Freitag	.347	.139	2	5	29	37

1.24 .58 47 10 91 148

HUDSON DIVISION							
N. N. J.	A. G. Weston, Jr.	2.8	1.90	166	104	211	471
N. Y. C.	F. H. Mardon	2.5	3.1	373	104	347	1008
E. N. Y.	H. N. Ammenheuser	2.4	6.1	321	124	836	1281

7.7 11.1 360 422 1394 2799

MIDWEST DIVISION							
Iowa	D. B. Watts	1.74	.806	64	34	88	209
Kans.	C. M. Lewis	1.16	.685	48	32	90	176
Mo.	L. B. Lalisse	2.02	2.46	63	34	748	845
Nebr.	H. A. Neilson	1.16	2.68	114	67	268	488

6.1 6.63 289 187 1192 1879

NEW ENGLAND DIVISION							
Maine	S. B. Coleman	1.86	4.97	363	227	769	1228
N. H.	C. P. Sawyer	.59	—	—	—	—	—
Vt.	C. T. Kerr	.59	.70	61	25	84	176
E. Mass.	Miss Hannah	2.04	2.98	205	155	480	749
W. Mass.	C. J. Green	2.03	1.29	81	39	181	329
Conn.	H. E. Nichols	1.23	.99	73	28	143	344
R. I.	D. B. Fancher	1.18	.56	16	12	113	141

9.84 17.86 797 484 1710 3885

NORTHWESTERN DIVISION							
Mont.	A. R. Wilson	.58	.269	—	—	—	87
Wash.	Otto Johnson	1.74	2.06	—	—	—	566
Ore.	A. C. Dixon	1.1	.372	—	—	—	98
Idaho	K. S. Norquest	.46	.407	—	—	—	181
Alaska	Lee H. Machin	.12	—	—	—	—	—

4.00 3.10 — — — 788

PACIFIC DIVISION							
No. Sect.	P. W. Dann	2.72	1.31	66	58	188	326
So. Sect.	L. E. Smith	8.87	9.30	605	404	1301	2810
Hawaiian	K. A. Cantin	.56	2.18	446	79	27	543

12.17 12.79 1117 532 1516 3179

ROCKY MOUNTAIN DIVISION							
Colo.	C. S. Hoffman	1.9	2.13	171	152	307	680
Utah	J. F. Wohlford	1.8	1.13	33	33	208	221
Wyo.	R. S. Morris	1.02	1.08	63	52	154	269

4.5 4.34 266 257 569 1089

SOUTHEASTERN DIVISION							
So. Car.	A. Dupre	.23	—	—	—	—	—
Ala.	H. S. Brownell	1.45	.920	19	23	177	329
Fla.	B. J. Grogan	1.45	1.10	77	83	111	275
Ga.	J. Morris	.81	—	—	—	—	—
Porto Rico	Luis Rebach	.058	.23	—	—	—	56

4.4 2.25 86 165 388 568

WEST GULF DIVISION							
Oklahoma	K. M. Eshet	1.16	.563	28	23	88	140
So. Tex.	E. A. Sahn	.87	.145	6	5	25	38
Na. Tex.	W. B. Forrest, Jr.	.87	—	—	—	—	—

2.90 .708 24 28 113 178

PRAIRIE DIVISION							
Man.	F. E. Rutland	.42	.408	40	29	33	102
Sask.	F. L. Maynard	.56	.208	14	21	18	83

.88 .61 84 56 51 155

ONTARIO DIVISION							
No. Ont.	Wm. Sutton	—	.234	—	—	—	55
East. Ont.	F. A. Harrison	—	.634	—	—	—	157
No. Ont.	J. A. Varey	—	.174	—	—	—	43
Cent. Ont.	A. R. Williams	—	1.12	—	—	—	378

2.3 2.16 — — — 538

VAN-ALTA DIVISION							
Mgr.	A. H. Amussen	.83	.328	25	15	44	84

.70 .230 26 8 24 58

MARITIME DIVISION							
Mgr.	W. C. Borrett	.70	.230	26	8	24	58

.70 .230 26 8 24 58

QUEBEC DIVISION							
Mgr.	J. V. Argie	.46	—	—	—	—	—

.70 .230 26 8 24 58

TOTAL FOR COUNTRY							
Originated	Delivered	5977	11982	Relayed	—	Total	24939

V

BRASS POUNDERS' LEAGUE

Call	Orig.	Del.	Rel.	Total
SEU	21	30	462	513
8DHX	75	34	260	369
6BJX	102	107	146	355
pil-ICW	121	43	162	326
8GI	15	63	288	316
6BUC	273	16	3	292
SAYP	120	111	52	233
9CDV	58	18	184	260
9DTK	87	42	127	256
8XE	31	18	206	255
1BIG	36	29	182	247
1AVJ	46	22	164	282
1ATV	149	23	45	217
8CNX	75	8	128	211
8DBM	26	38	142	205
8GZ-ZG	15	36	154	205
8BBG	26	33	142	201
4JR	10	34	136	180
1KL	28	29	119	176
1LM	4	1	170	175
9XM	47	22	146	175
6BQ	20	9	146	175
9IX	54	21	96	171
2AJE	30	13	128	171
2CY	100	62	4	166
2NZ	44	5	6	155
9DOL	35	19	98	152
9PU	7	10	134	151
9DMJ	—	—	150	150
6ANO	25	3	121	149
1AMZ	49	76	24	149
2APT	56	1	91	148
2FK	59	21	68	148
6RV	12	2	129	148
9DKS	53	56	25	139
6CUW	15	5	115	135
9DKA	38	34	68	135
9EAM	14	19	97	130
9CPM	2	—	126	128
6AJM	48	33	40	121
9CAA	28	13	78	119
9DXY	25	13	90	118
9LJ	6	4	106	116
9XI	15	13	82	110
6BDS	52	—	57	109
1JL	44	25	39	108
9DPJ	11	14	82	107
1AAV	16	19	72	107
9RR	14	8	84	106
9ZT	11	68	27	106
9DWN	4	3	98	105
9NV	37	24	38	101
9AAE	32	15	54	101
8ZO	—	2	99	101
1JL	44	25	31	100
9ZK	—	—	100	100

7BB would have been listed in the Brass Pounders' League if the number of messages originated delivered, relayed and total had been turned in to Headquarters. Watch this, OM's!

8EU has been on the job right along. This month he succeeded in pulling up into first place and rates the starred rectangle. 8DHX is in second place while 6BJX still holds his own in third place. pilCW handled more messages than last month and managed to pull up a bit so that it isn't so far to the top.

E. L. Maneval—SEU
1479 W. Fourth St., Williamsport, Pa.

Orig.: 21; Del'd.: 30; Rel'y'd.: 462; Total 513.

DIVISIONAL REPORTS

ATLANTIC DIVISION

MARYLAND—3PS, operated by Midshipmen Fenlon and Knight, is on 87 meters and is reported from the west coast as the loudest east coast station. 3BUR is QRW from studies at the N. A. SWA's 50 has gone west and he is carrying on with

a fiver. 3ACW is getting out FB on 40 and 80. 3PH has been putting strong 38 meter sigs across the pond with a 50. 3AOJ is perking again with a five wattter. 3QI has shot his big jugs and is going strong with a single 50. 3SF has been QSO N. Z. and Australia. 3BMO has had trouble getting down on 40 but is FB now. 3RP is breaking records with one UX210. 3ALT has blown his H tube and is going with a UX210. 3VI has dropped from 80 to 40. 3AIB is QSO west coast on 40. 3HP is FB on 80. 3AHA is putting pure DC sigs into all parts of the globe. 3CGC and 3GT put out snappy sigs on 40. 3LG is QRW studies. 3MF has sold out and says he is through with transmitting. 3AA is coming back into the game. 3ARB reports not much DX.

Traffic: 3ACW 32, 3WA 13, 3PS 27, 3AIB 22, 3HG 11.

EASTERN PENNA.—Dist. 1—3VT is now working with a 301A.

Dist. 2—3BNU was off last month waiting for a new 50 wattter. 3BLP is QSO west coast R7 on 80 meters using crystal control. 3TS is slowly getting a station going on short waves. 3CTZ is now working on 40 and 80 meters with a 5 wattter and doing fine work. 3BLC is working on 40 meters and stepping out fine. 3EK is going strong after a period of idleness. Easton has several new stations and should help to increase traffic totals. 3CDN and 3MQ are QRW with school work and find little time for traffic. 3TP is doing fine DX. 3CJN is the ether buster of Allentown. 3UE and 3AFW are working the short waves consistently. 3AVL is still knocking 'em dead and wins the fur lined stove pipe for DX shooting. 3LK is pounding out great on 40 meters. 3BUV is very QRW with land wire work. 3AUV has a new 500 cycle motor generator. 3BQ expects to be on 40 meters soon. 3BVA did some excellent DX work while home from college at Easter. 3NP reports QRN is showing its effect in his vicinity. 3ZO keeps schedules daily with 8ZG, 9ZA, 8PL and 3AUV. 8EU's traffic hit a high point in the face of a flat 50 wattter. 3CCQ added some DX countries to his 5era large list. 3AVK is flat due to moving and a popped H tube. 3CGZ QSOD A on a new MG. 3CMO is a new one and busted his Ken. rect. and is now on slop jars. 3BFE is flat due to a gang of tubes leaving and a busted inductance. 3BSZ built a new xmitter and a ham receiver for a BCL. Handled code stuff from Brazil to Asia. 3CDB-3AH0 busts out with the low power bug—a 201A and 90V B batas. 3AFR guards his antenna and CP from BCLs with a shot gun. 3CFT is fussing with 40 yet. 3BIR just got his rect. fixed up. 3DQG gets out when the BC fone set is not taking all the colleges DC.

3BWI sends in a good report. 3AJF is sick. 3BLM has the low power-wave fever. 3BCQ is getting out FB. 3BFN pounds through on 80. 3BWI is going on 80. 3AOL worked G on 40. W-B hams are requested to cooperate and get reports, etc., to B. Warner, 14 Grant St., Wilkes-Barre. 3BIT is going FB on both 46 and 80 meters. 3AJR, 3COR and 3DTL are all pounding away on 40 and 80. 3COR says he has a hi-loss low powdered rig stepping out FB. 3BQ moved to 597 N. James St., Hazleton, wheres room is now at his disposal for an NSS ant if he needs it. 3BRT has a wicked 100 watt rig. 3RQ didn't get his 100 watt set in shape due to punk tubes. We understand our old friend S. Ballentine has an X license at White Haven. DON'T FORGET TO VOTE!

Traffic: 3VT 1, 3AE 2, 3ZM 5, 3PY 3, 3BL 5, 3BUV 4, 3BLP 20, 3CDN 2, 3LK 17, 3CJN 7, 3UE 12, 3AVM 4, 3AU 48, 3BQP 6, 3BVA 44, 3NP 5, 3ZO 101, 8EU 513, 3CCQ 16, 3CGZ 25, 3CMO 6, 3WH 4, 3BIT 14, 3BCQ 9, 3BWI 9, 3AFR 1, 3AH0 16, 3BSZ 54, 3CFT 14, 3CQD 4, 3BQ 30, 3LW 6, 3AIY 12, 3HD 13, 3JN 12, 3AY 12, 3ABH 18, 3FS 5.

WESTERN PENNA.—Dist. 5—3AXD is now working on both 40 and 80 meters. 3BOY is getting out very well using a 201-A. 3CMP is experimenting with the ultra short waves. 3XE has been doing good work on the PRR tests.

Dist. 6—3DOQ has been having trouble on 80 meters. 3CJL is still building the big transmitter which will have a 50 watt master oscillator, crystal control. 3BES has forsaken the 50 wattter. 3BA is now operating at 3BES. 3AKI is testing with 3SN for Signal Corps Army Amateur Net.

Dist. 7—3DRB is on the air again with a 50 wattter. 3ABW has been doing excellent test work on 40 and 80 meters. 3CUH has dropped down to 40 meters. 3AUD is now using two 50 wattters on 80 and 176 meters. 3BYI has handled some traffic with the West Coast working both ways.

Dist. 8—3BRC has been working schedules with 3GI, 3GU, 3CEO and 3BUN. 3BDJ has been quite

active. SGU and SBVK have been experimenting with loop transmitters.

Dist. 9—SGI is still the undisputed leader at this end of the state when it comes to handling traffic. SBRB is living up to his reputation of the past and is trying hard to turn in a higher traffic total than SGI. CEO was third best in the way of traffic. SBRB is on the job handling his share of traffic. SCRK has just given his entire outfit an overhauling and is on the air again. SDNO blew the old fiber and installed a UX210. SAGO and SCHF have added French SZO to their list of stations worked. SDKS has been inactive due to sickness but reports a new ham station, SHM. SBY is looking for some "S" tubes. SAYH reports that he has perfected a new rapid wave change outfit. SBJV is back on the air again. SARC is a newcomer and has done well with traffic and the PRR tests in the central region. SOW and SDIO have been grinding quartz crystals for the last few months. SBT is heard often on the air. SBHJ is rebuilding his station. SCLV and SBHJ are installing a shortwave transmitter and receiver for the Pittsburgh Unit of the U.S.N.R.F. SAKU is using one 250 watt on 40 meters. SAGO has handled a very large amount of PRR traffic this month. SVE is knocking out some good DX as well as handling a large amount of traffic. SJO, SBIT, SCUK are heard often. S Cosgrove has high hopes that he will be on the air soon if the RI will donate him a license. SPX is on the short waves. SAKJ is working with SPX on their new s/w station. SHK and SVX are heard often at the CM's station. ESCFH is taking out a new license and will be back on the air soon on 40. SZD is on the air again experimenting with B battery plate supply and a 5 watt. SZA has been working foreign stations consistently on low power.

Traffic: SAXD 2, SXE 255, SDOO 12, SCUH 23, SBRC 21, SBDJ 42, SGI 316, SBRB 51, CEO 37, SBBL 15, SCRK 8, SDNO 6, SDKS 6, SBY 4, SAYH 3, SVE 48, SCLV 11, SAGO 70.

WESTERN NEW YORK—With the coming Convention to be held at Buffalo, June 24 to 26, the gang have been very busy getting things in shape for the grand reception. E. B. Duvall will be the guest of SPJ. Remember it's the FIRST ATLANTIC DIVISION CONVENTION AND SPECIAL RATES HAVE BEEN SECURED FOR THE VISITORS. AND ITS A.R.R.L. to the core. SKW has been appointed an Army station and have been doing fine work on 40. SBLP has been handling traffic and attending school at same time. SARG and SAFO are operating separate stations now. SDSI handled traffic. SDPL is traffic chief of Radio Association of Western New York and desires a new title for his office. SADE has moved out into the wilderness where he can pound brass without disturbing the neighbors. Cata. SBCL will be on this summer with a 250 watt. SBRK came home from college but the gang couldn't find him. SRV is still on the air after schedules. SFP, another checking station with a real wave meter, is doing fine work with foreigners. SUL still has the traffic sizzling through his station in great style. SQB is still working hard on the PRR tests. SAYB has traffic as usual. John Eichmann, the Superhet expert in Buffalo, has fallen for ham radio at last and just received the call SAOM. SPJ now works both 40 and 80 meter bands and has a transmitter and receiver for both bands. SDAJ is the Crystal control station in Niagara Falls. SDAJ will check any wave meter or station on request. SBSF is on again with a 250 watt. SCKT is off the air. SHJ is also working PRR tests. SDFK is working Europeans since rebuilding transmitter. SVW still sticks to 80 and 175 meters. SDRJ, SAKS and SBQK are dividing honors for their work on 40. SDKN is a new one in Ithaca, N. Y. SCKN is handling schedules on 76. SAPU operates 2SZ occasionally, SAVJ and SDA have DX records and not much traffic. SDHX seems to be the star station for schedules. SCA is a new ham in Fredonia. SAXA is another new station. SDME is having trouble with antenna. SZU is married. SADM has trouble with power line interference. SCKJ is a new station in Auburn, N. Y. SAHC will be on again this month. SABG is a new star in Ithaca. SCBS was heard in England on 10 watts. SDBC is working hard on checking up BCL modulation troubles. SDBQ is having trouble with the BCLs. SCNX does all the handling of traffic in two weeks of month. SAXA gets to Italy easily. SBIN is experimenting with self rectification and has some H tubes. SCTL is experimenting. SABX is back after a long vacation. SBHM is now in Hornell and will be on soon. SPK is attending R.P.L. SNT works 7s, 6s and ch's. SUL handles messages with N.V.E.

at Guantanamo Bay, Cuba. SDPL has joined the USNRF. SCAN is also in USNRF pounding out well. SDHX gets PBL credit this month, 7CNX as close second. SDBC has been on the 80 meter band for the past seven months.

Traffic: SNT 13, SBCZ 4, SHJ 8, SDPK 7, SBSF 6, SDPL 18, SADE 4, SQB 6, SCNT 26, SPJ 15, SABX 2, SAXA 7, SCTL 10, SBIN 60, SDME 32, SCZP 18, SBF 4, SCKJ 12, SADM 11, SZU 40, SCKH 35, SAIL 4, SDKN 16, SBQK 40, SAKS 26, SDRJ 21, SDA 2, SDHX 369, SDX 2, SUL 55, SCNX 211, SAVJ 4.

DISTRICT OF COLUMBIA—The most encouraging observation made this month is with respect to new stations and new operators. There have been several such cases where the operator has not yet a station license but has received the operator's license and has been experimenting with transmitting equipment. Here's hoping this will keep up. SJWT and SJO report the installation of phone sets on 180 meters. SJWT blew his 14th 50 watter this month. The 180 meter transmitter at SJWT is in addition to the two regular ones on 40 and 80 meters. SJO handles practically all of the messages coming through his station by phone.

Traffic: SJWT 226, SAB 34, SASO 24, SACM 18, SJO 2, SBKT 7.

CENTRAL DIVISION C. E. Dart, Manager

OHIO—Dist. 1—SDND has rebuilt his transmitter, using a UX210. SEQ has been unable to keep schedules on account of sickness. SBIQ blew a tube so is off the air temporarily. SBSA-SBEY is still using portable and still handles messages. SDCH has started up again. SAOE is now using 5 watts and reports better work than with his 50. SBIQ had too much noise lately so no report. The Findlay Radio Club is building a new shack and will be ready for business in about two weeks.

Dist. 2—SDDQ has two schedules daily. SAGS is operating at Valparaiso, Ind., under the call 9BEEF. He is using the Hertz antenna scheme and says it is FB. SWE finally got his stuff going but is still having trouble with it. SBIQ is being held up on account of no crystal for his outfit. Expects to be going soon if new crystal is a good one. SZE has been sick for a month but is back on again. SRY is still in Kentucky but expects to be back at the old location very soon. SBCE worked A, BZ, Z and PR this month.

Dist. 3—Old man QRN has been on a rampage most of the past month giving some of the boys cold feet. SDAE reports a slight decrease in activity due to the QRN and school activities. SRJ finally came down on 40 meters and seems to be stepping out FB. SAZU, SBF, SDAE as well as several others are doing very good DX. SADA deserves much credit for sticking through to the finish on the PRR tests. The Cleveland boys were mighty happy to have Mr. Hebert of HQ as guest at one of their club meetings. SACY has been sick.

School has kept SBNH from being on the air but SBLP and SBTH have been vibrating the head phones of amateurs in many foreign lands.

SBKM has been playing sailor on one of the lake boats and as a consequence has a smaller traffic total than usual. The Warren and Youngstown gang have been busy getting their 50-watt crystal control transmitter installed in their club house. SDCH has been doing consistent work with 7.5 watts. SDRX is mourning the loss of a 50 watter. SDQF says he is getting out better lately.

Dist. 4—SDEM put up a tin mast but it blew down. SDSY changed back to 80 meters. SGZ takes traffic honors in this district again. SPL is off the air for a short time. SCBP is QRW school. SCBI is modest, never says much, but the DS knows he does good work. Welcome back, SBBH. SBAU was too QRW with the Charlestown and YLs to report. SBYN is now using a Hertz antenna, his cage having blown down.

Traffic: SAOE 14, SBSW 51, SBSG 17, SCVS 8, SBSA 5, SANX 8, SDND 2, SBN 9, SDDQ 29, SAGS 15, SWE 8, SBQK 4, SDIA 98, SBLP 44, SBFM 40, SDAE 31, SBOP 27, SDRX 25, SRJ 12, SADA 12, SAVH 10, SAOX 9, SAZU 9, SCK 2, SACY 47, SBYN 108, SDEM 15, SDSY 20, SGZ 205, SPL 12, SCBP 7, SCBI 24.

WISCONSIN—Dist. 1—9DTK says it appears that 40 meters is fading out as summer approaches and 80 is getting better. 9DOL now has a commercial ticket. 9BKR is QRW Badger A.R.R.L. News and school. 9RH says traffic moving is better on 40 now.

9BWO was QSO an Aussie and 2 Hu's. 9BSS is still doing good work on 80 meters. 9CDT is trying to get set for work on 40 meters. 9CIB will have a crystal set going soon. 9AFZ is again experimenting with antennas. 9ATO says not much traffic floating around these days. 9NY received a card from g5AX on 40 meter transmission. 9CKU did good work on 40 meters until his liver went west. 9ELD will soon be on the Lakes again. 9UH is off until Sept. 9EHM's transmitter is being rebuilt. 9BTK is operating on both 40 and 80 meters. 9BEK is attending the U. of W. and only operates when he comes in from Madison.

Dist. 2—9XH-EK is on every Mon. Wed. and Fri. night from 8 to 12 pm. 9CM is KRW school. 9DZV's antenna tower came down in a storm so he will not be on for some time. 9BIR has trouble getting his crystal set to work. 9EGW is using a DeForest H tube. 9COI has an entirely new station now. 9EAN reports not much luck on 40 meters. 9EAR is working break-in with fair success. 9DLR is working on 40, 80 and 175 meters.

Dist. 3—9DKA is going to install a 1" tube antenna to prevent swinging. 9ANE compliments 9DKA for his reliability as an ORS. 9CGL seems to be the only active station in Sheboygan. 9AVB has his station in good working order. 9AZY makes his first report. 9CXX sent in his report on the stationery of the Plymouth Radio Club. 9EMD is rebuilding for a 50 watt station. 9AEN is looking forward to vacation when he can be at the key.

Dist. 4—9AZN is on the 40 band. 9CAV reports from Alma Center. 9DCX is building a permanent shack for operating. 9EIL has a new job operating a broadcasting station at Eau Claire.

Dist. 5—9ELI is the only station reporting. 9DPR has joined the ranks of the benedictis.

Traffic: 9DTK 256, 9DOL 152, 9BKR 50, 9RH 26, 9BWO 24, 9BSS 22, 9CDT 10, 9CIB 7, 9AFZ 5, 9ATO 5, 9NY 5, 9CKU 1, 9ELD 1, 9BTK 75, 9VD 9, 9XH-EK 82, 9OM 25, 9BIB 2, 9EGW 12, 9COI 2, 9EAN 12, 9EAR 13, 9DKS 139, 9XM 175, 9DLD 8, 9ELI 67, 9AZN 28, 9CAV 2, 9DKA 135, 9ANE 50, 9CGL 17, 9BVA 6, 9AZY 4, 9CXX 4, 9EMD 2.

INDIANA—Dist. 1—9AAI must be still QRW on Superhet. 9AVB is unable to be on evenings as he is busy carrying the morning papers. 9ECI handled some nice traffic. 9BKJ kept the Detroit gang busy with messages concerning illness of a relative. 9DPJ and 9QR were heard in England. 9II was installed at the radio show and stirred up quite some excitement. 9DDA works fone on 175 meters. 9EG is still saving his money for that 204A. 9EJT has sold out and is going to sea. 9EJU works fone on 177 meters with fine results. A BCL in Muncie has a five tube low-wave receiver that brings in the foreign hams on a loud-speaker. 9BRG is with us again. 9CAP has a new flivver and going after the YLs strong. 9DRS is giving 40 meters a try again. 9BUQ is working 40 with a new M. G. plate supply. 9CXC is still at radio school.

Dist. 2—9DHJ is keeping a regular schedule with SCEP. 9DXI is working on 40 and 80 but is having QRM from power leaks. 9BK reports too much business for radio. 9CUB is married and on the air as usual. 9BMT, the gang's youngest squirt, is going good on 80 with a 5. 9BVV and 9BVX are new men on 80. 9DQV is starting up with a 7½ watt. 9AIL is forever through with YLs and is coming back on the air. 9EBF is still on. 9BO is using 7½ watt and B battery plate supply successfully. 9OG is using high power but complains of no messages. 9CCL is off on account of YLs day and night. 9AMI blew his ancient liver. 9BBJ found the trouble in his set. Blown blocking condensers, blown grid leak, and blown milliammeter, otherwise his set is FB. 9BYI reports traffic good on 40 and 80. 9ABP is on the army radio route with 7½ watts. 9AEB is rebuilding. 9CEM is on all the time with his new set. 9BUZ is fairly successful with low power on 20 meters. 9XE is broadcasting as no traffic. 9BSK worked AXU, a whaler 6000 miles on 21 meters. 9AHE is using a 5 watt and working the 6s. 9CP is doing some unusually good work on 20 meters. 9ERW just installed a 50 watt. 9DYT is trying out a Hertz antenna. 9DDZ's set perks ok on 80 meters.

Dist. 3—9BSC has worked all continents except Africa. 9EWB has a 50 watt on DC and getting out FB. 9NG is using all of his power (5) worked 6TS at noon. 9BEP is getting out fine on 40. 9DIE lived up to his call—he sold his set and got married. 9AHM is going strong as usual. 9BSC is building a 250 watt crystal controlled set so plug your ears.

Dist. 4—9CNC uses two 201As and B batteries on 40 and 80 meters. 9BQZ is using a 201A and 550

RAC, operating on 175 meters. 9DPI uses 3 201As in DH circuit, 250 volts dc on plate. 9BNP uses an H tube with 1100 on plate. 9AIP is just starting up. 9BCM is going good for a beginner.

Dist. 5—9CMQ is acting as DS for Dist. 5. 9CSC is on 37.5 meters regularly. 9CMJ has had transmitter trouble. 9CMQ has been handling a lot of traffic for his dad relating to the auto business he is in. 9BME is going strong on 40 meters.

Traffic: 9DPJ 107, 9ECI 47, 9AFY 31, 9BKJ 20, 9AAI 26, 9BUQ 17, 9CXC 14, 9DRS 18, 9AVB 8, 9EGZ 5, 9BRG 4, 9EJU 1, 9DHJ 11, 9DXI 4, 9BK 6, 9CP 17, 9ASX 10, 9BVV 1, 9BVX 1, 9BMT 1, 9DQV 1, 9AEB 18, 9BYI 22, 9ABP 2, 9CEM 3, 9BSK 15, 9AHE 5, 9ABI 42, 9ASN 20, 9DYT 6, 9EBW 23, 9BSC 37, 9CNC 3, 9BNP 35, 9BME 30, 9AQU 12, 9ADK 16, 9ASJ 10, 9CBJ 3, 9APG 1, 9ACK 2, 9DSC 12, 9CYQ 14, 9EJI 25, 9DOM 5, 9CLO 11, 9BVZ 4, 9DUC 4, 9ADN 83, 9CSC 60, 9CMQ 30, 9CMJ 12.

ILLINOIS—Dist. 1—9BHT on 38 meters, worked 1BAZ. Mr. Shalkhauser, Physics Instructor of Bradley Poly. at Peoria, Ill., is experimenting with a 210 local oscillator for use in calibrating Peoria wave-meters.

Dist. 2—9ELF is back on 150 meters to chew the rag and make friends. 9BRX has a new set, using a sync and No filter. 9ELR says one tube works better than two. The Radio Inspector has been holding First Grade licenses in this district. Most passed OK. 9ARM is the new Village Board Trustee.

Dist. 3—9AHJ rebuilt his transmitter and has a new B-T receiver. 12-200 meters. 9CSW is again getting the fever and will be on soon. 9ATT is quitting the game for about a year. 9AHJ reports high waves the best of all.

Dist. 6—9ALW has transmitter trouble. 9EHQ works sixes easily with 10 watts when on. 9CEC is rebuilding. 9CDG is remodelling into a low power transmitter. 9DQR is listening to G. E. Co's tests.

Dist. 7—9ALK is now QRW for 40 meter schedules. 9NV is building a 250 watt 83 meter fone set. 9AFX got his commercial ticket. There is a new aerial at 9AAW. 9AHD says his old 5 watt beats his new H. 9BNA moved to 179 N. Harvey, Oak Park, Ill. 9DLG is now on 80. 9GE is still at school but traffics with two A tubes. 9IX threatens to put in 500 watts. 9CEJ and 9FJ have been recommended for ORS. 9ALG had to come from Texas to handle traffic in Chicago. 9CIA put up a Hertz on 40 and 80 bands. 9EFF has higher power. 9CSL junked the panel for breadboard. 9APY has a new set on 40 besides the regular on 80 and 150. 9BAA and 9DXG collect messages at school. Chicago delivered over 200 messages this month. 9QD is on 40 often to avoid QRM. 9AOA uses a Hertz on 40. 9PU is experimenting with antennas. 9DPL is out for an ORS. 9DDS is on 40. 9NK is about to enter the fifth ham stage. 9CSB worked both coasts, daylight and was reported in Australia. 9DLG is off the air for a month. 9KB lost his quiet hours. 9BFF is back on the air on 80 both fone and CW. The ops at WMAQ have a station under the call 9IM. 9BVP has a dandy card. 9ZA uses a Hertz on 40 and reports FB. 9BWS is going down to 20 meters soon.

Traffic: 9IX 171, 9PU 151, 9NV 101, 9AAE 101, 9BVP 82, 9CXC 81, 9CEJ 79, 9ALG 76, 9DDE 75, 9RK 64, 9CSB 61, 9FJ 60, 9BNA 55, 9AIZ 47, 9APY 44, 9AAW 28, 9QD 27, 9DOX 36, 9DYD 35, 9DWH 32, 9EHQ 30, 9ALK 30, 9CNB 28, 9AFX 27, 9DLG 21, 9DPL 20, 9AFF 19, 9BBQ 18, 9DYL 18, 9DAF 14, 9CG 14, 9EJY 13, 9CSL 12, 9ALJ 11, 9BHT 11, 9DQR 10, 9DXG 10, 9AAJ 9, 9AHJ 9, 9CWC 9, 9ELR 8, 9AQG 7, 9ALF 7, 9BRX 6, 9DDS 6, 9AOA 4, 9GE 4, 9CIA 3, 9AJM 2, 9ALW 2, 9BIZ 2, 9NK 2, 9RQ 2, 9DCG 1, 9MR 1, 9AHJ 1, 9BWS 1.

MICHIGAN—Traffic: 8CPE 55, 8EPP 5, 8QN 4, 8CM 40, 8ACU 3, 8ZH 5, 8ZZ 19.

DAKOTA DIVISION D. C. Wallace, Mgr.

SOUTH DAKOTA—Dist. 1—9CKT is the President of Madison's largest graduating class and finds himself extremely busy. 9ALN continues to pound out DX. 9AJP is a new station at Sioux Falls and is going with a 201A. 9DIY is still busy.

Dist. 2—9BBF had the roof burnt off over the station but the fifty and all other tubes came thru OK. 9DID is building a UV-199 transmitter for experimental purposes. Will have the big crystal controlled as soon as he can get a crystal ground. The R. I. dropped in on the Huron gang and as a consequence we are short two good stations for the time being. 9DWN got his station on the air during the spring vacation and handled a nice bunch of

traffic by the means of schedules. 9CJS has again completely rebuilt. 9NM wishes the gang to know that schedules cannot be kept on account of the work at this time of the year. 9BKB is getting an H tube and expects the school and YL QRM to let us somewhat. 9BDW worked KEGK. 9DZI's kenotron went bad and he is using AC on 40.

Traffic: 9DIY 2, 9ALN 22, 9CKT 16, 9CJS 16, 9DW 105, 9DGR 62, 9BDW 11, 9BBF 14, 9NM 23, 9DZI 61.

NORTH DAKOTA—9CCT is making a loud noise on 38 meters. 9BJV is a new ORS and has been doing good work on 40 and 80 meters. 9BQD has rebuilt his set for 80 meters 10-watt fone and CW. 9DM is going some after being stranded for power for some time. 9CZG is back on the air again. 9DIG says he cannot be on the air much from now on. 9CRB has been doing exceptional work on 178 meters. 9DKG is still QSO both coasts with 15 watts master oscillator on 80 meters. 9EFN is having trouble burning up his neighbor's radio frequency tubes with his stray currents.

Traffic: 9CCT 35, 9DM 6, 9BJV 3, 9DIG 4, 9EFN 4.

MINNESOTA—Dist. 1—9EGU has been off the air most of the time during the past month rebuilding. 9EGF will not be with us for a time. 9ADW works the west coast regularly and does fairly well with traffic. 9DKR works good DX. 9AOG just returned from a trip to California and is itching to get back on the air again. 9ADS reports hearing a Britisher at 4:30 pm. 9CKI and 9KV are the only active stations in Duluth. 9KV worked 3 more Zedders. 9BJD had to tear his set down on account of the landlord. 9ADF is in the hospital. 9BMB, 9BPW, 9DFD and 9ADF are inactive.

Dist. 2—9GZ is an old timer back on the air again at Wheaton. 9EHO has received quite a lot of material towards rebuilding his station which was destroyed by fire. 9COS is having trouble with his H tube. 9SF has been appointed an Army station. 9DBB will be off the air until fall. 9AIR has moved his radio installation to a shack where he can be by himself. 9EFD handled several important Army messages. 9DBW has trouble with his rectifier. 9DJW keeps daily schedule with 9BBT. 9BBV is experimenting with antennae and filter systems with good success. 9BNF keeps regular schedules and continues to work DX besides. 9EBC works on 80 meters. 9BIY suffers from a bad power leak so was unable to do much work. 9CPO is still off the air but expects to be back soon, as it is hard to keep from it. 9CAJ is back on the job again after his West Coast trip. 9BOI is rebuilding his set with changeable coils for 20, 80 and 176 meters c. w. and fone. 9BKX was off the air for three weeks on account of sickness. 9BTZ hears everything with his 500 foot antenna.

Dist. 3—9XI worked Africa, Japan and Tasmania. 9BVH continues to work foreigners. 9APE joined the 109 Aero squadron and is going to make some tests with 9BMK as he is in the Radio Division. 9CUM keeps schedules with 9ANE on Saturdays. 9ASW has great luck with his new H tube. 9ABK lost 8 miles of filter condenser and his DC. 9ELJ uses a 201A with 90 volts battery. 9DHP is a new ORS using a UX-210. 9DGE has reports from 19 countries. 9ZT took 18 sheets of press from foreigners. He keeps weekly schedule with NAJ and worked 7 districts in one day on 20 meters. 9DAW is on with 5 watt. 9CPM is handling big traffic. 9DWO is at a new location now with Zeppelin antenna and a 50 water. 9BNK is back on the air again with UX210.

Traffic: 9CKI 82, 9KV 37, 9EGU 6, 9ADW 18, 9DKR 6, 9EGF 16, 9CWT 46, 9BMR 28, 9CDV 260, 9SF 8, 9BBV 5, 9DBW 31, 9BIY 16, 9AIR 12, 9COS 1, 9DJW 20, 9EBC 10, 9EFD 9, 9XI 110, 9CPM 128, 9BNK 64, 9ZT 106, 9DGE 81, 9DHP 8, 9ECC 68, 9ELJ 12, 9IG 40, 9ABK 28, 9BMX 5, 9DYZ 2, 9BAY 57, 9ASW 10, 9BVH 4, 9CUM 6, 9GH 4, 9BTZ 6.

DELTA DIVISION B. F. Painter, Mgr.

THE Director hopes that the four sections of this Division have each nominated their best man for the position of SCM. The new things after electing your SCM is for each one to get behind him and do all possible to help him in his work. To do this, it is necessary that each one of you write to him every month telling him what you have been doing, hope to do and what the rest of the gang are doing.

LOUISIANA—5EN is having trouble with his transmitter and is not getting out as well as usual. 5KC states that he is using a 201A tube with an indoor antenna and a tin roof for counterpoise. The

Delgado Trades School, 5YF, just got on the air. 5UK is still working his 50 watt set. 5AEN continues to kick out and has worked Australia with his 5 watt. 5APA is a new kid doing good DX work. 5SQ is building a new ACCW set. 5IC is busy with his oil wells. 5WY worked all districts again on 40 meters but is rather busy. 5ANC and 5AGJ are on 80 meters. 5AKI now has a 20-600 meter model C-7 superhet on loop the same as 5ML. 5AKI and 5ML have installed 35 foot gutterpipes and are doing fine DX on 40 and 80 meters.

Traffic: 5ML 7, 5EN 6, 5KC 18, 5UK 6.

MISSISSIPPI—This state reports a very great deal of QRM from County and State field meets and High school plays. 5QZ is always to be depended on for a report. 5AKP's transmitter is on the blink again for no apparent reason.

Traffic: 5AGS 13, 5AKP 15, 5QZ 6.

ARKANSAS AND TENNESSEE—5WK reports that he has moved to Monette, Arkansas. 4HL and 4JJ visited 5AX and 5MI last month. 5AJ has started sending in reports again. 4DA advises that he is on the air on 40 meters. 4MM converted into a 250 watt master oscillator, crystal controlled.

Traffic: 4AJ 27, 4HL 9, 4FP 7, 5WK 9, 5ACY 25.

HUDSON DIVISION E. M. Glasser, Mgr.

2 PF has taken over the Army-Amateur work in the Second Corps Area acting as A.R.R.L. representative. The DM had to resign from this position because of heavy college and outside work taking up all his available time. Appointments are being made as rapidly as the army is asking for them.

ORS are again urged to report on time or their appointments will be cancelled. The Division was well represented at the New England Division Convention. 2 CYX, 2APV, 2NZ, 2BNL, 2PF, 2GP, 2BW and 2APF attended. 2 BW won the liar's contest. (2PF wasn't there on time).

NEW YORK CITY—Brooklyn—2WC and 2CLA are crystal controlled transmitters. 2JB manages to pound brass after operating WNYC all evening. 2NO is another op at WNYC. 2QH and 2CV are coming back on the air strong soon. 2CRB is moving from Brooklyn for the summer. 2PF is too busy with the Convention to be on the air. 2PB is active on 40. 2UD is busy with crystals and YLs. 2BRB is QRW building transmitters and college work.

Queens—2AVB is doing some fine traffic work.

Bronx—2ALL is experimenting with antennas. 2APV is still doing great work on 40. 2BBX will be on the air soon with a 50 watt using the KFUH circuit. 2CVL was back from college during Easter week. 2CYX is on the road again and will make his yearly visit to the 3rd, 9th, 4th and 5th districts.

Manhattan—2FK reports the gang have to study and cut the wireless work. 2AMJ is sure running in hard luck. Manhattan Electric Supply Co. has decided to cut down the office force and Frank has lost his job. 2KR reports that he is building a 150 watt set for a radio store. Ed Wilbur was up to the New England Convention and had a great time. 2LD is still on the job, using a MG set. 2EV is now rebuilding all his receivers. 2ALS hasn't done much. There is a good looking YL taking his time. 2CZR has at last worked Europe and his sigs were FB. 2CHK is still keeping schedules with c2BE. 2HJ has started up again amidst the experimenting in the college laboratories. 2BRB and 2AOF are at the key.

Richmond—2AKK is going strong on 40 and 80. 2CEP is on board KVF. 2AYH is a new station using a fiver. 2ACZ is handling a lot of traffic with his 10 watt. 2AYW is a new station in Totenville. 2CZN hopes to be going strong soon. 2AKR, 2AKK, 2CLF and 2AFV have schedules with KVF. 2ATQ is getting sick of low power and expects to QRO soon. 2AFV has a new UX210 on 40, 80 and 180 meters.

Traffic: 2ALL 64, 2APY 23, 2BBX 84, 2CVL 44, 2CYX 61, 2NZ 155, 2FK 148, 2CHX 12, 2AMJ 19, 2KR 6, 2BNL 2, 2LD 6, 2LM 14, 2EV 6, 2ALS 17, 2CZR 58, 2APJ 11, 2AKK 39, 2AYH 1, 2ATQ 3, 2AKR 30, 2CEP 81, 2CZN 16, 2AFV 31, 2ACZ 94, 2AVB 33.

EASTERN NEW YORK—Dist. 1—2AV is doing good DX now. 2AUL is recommended for an ORS. 2AWQ is also recommended for ORS. 2AWX is a new station. 2AJE heads the traffic this month. 2RPB has been experimenting with Lecher wires. 2AIZ blew all his tubes so has not been on the air. 2KX does not get on much.

Dist. 3—2SZ is now on the air with a new fifty watt set. 2CYH is stepping out in good style. 2CDH

is still doing good work in spite of being busy with his baby chicks. 2AGM worked Hawaii and Brazil. 2CTH is doing the same good DX as usual.

Dist. 4—2AKH is on again. 2CYM is on some but is QRW. 2MK is reaching out as well as ever. 2BSE is on again on 80 meters and his new OW helped him put up the antenna and counterpoise. 2AI, who has been sick for a long time, expects to have a receiver and a low power transmitter going soon. 2AOX is QRW school. 2COV is working out of town so is not able to be on the air much. 2AGQ is still stepping out as well as ever.

2CTF has rebuilt the transmitter. 2AJQ is using a.c. on 40. 2ANN is also using a.c. an 40 with a Hertz antenna and has worked NZ, Morocco and Tegucigalpa in Central America with 165 watts input. 2AG has gotten his crystal controlled transmitter working on 80 meters. 2DD changed to the old Armstrong circuit and likes it better than the Hartley for ease of adjustment. 2ADH has an 82 meter crystal and intends to get on with it soon. His 500 cycle note sounds too good on 40 to leave that band yet. 2ALC is back on 80 with his generator and a five watter. 2ASE is getting out well on 40 and handles a batch of messages. The Yonkers Radio Club has three more new operators under way and points with pride to eight graduates who have gotten licenses. 2CIL is operating YHZ bound for Naples, Italy, and is listening for the gang on the way across. 2BOW has joined the club and will send in reports in the future. 2CNS is QSRing his traffic direct instead of relaying to distant points on 40. 2AAZ is on 80 again with a D.C. note with less than two miles of filter. 2BQB went to the first district convention in Providence and hasn't been on much due to school qrm.

2AIU and 2CYH should report to the DS, whose QRA is Box 118, Yonkers, N. Y. 2LA is rebuilding his transmitter a la 2BHY. 2APT wants an appointment as Army-Amateur net station. He has two separate xmitters for 40 and 80. 2AML intends to report regularly and wants an ORS appointment. 2AXP is on 40 meters for a change with a five and is doing good work. 2KV still hammers away on 40 and 80 when he gets a chance.

Traffic: 2AV 67, 2AU 13, 2AJE 171, 2AWX 10, 2AWQ 17, 2KX 7, 2SZ 9, 2AGM 18, 2CTH 21, 2CDH 70, 2CYH 11, 2ANV 11, 2AOI 25, 2AKH 29, 2CYM 4, 2AGQ 15, 2APT 148, 2ASE 36, 2AAZ 25, 2AML 23, 2BQE 11, 2AAAN 10, 2CNS 8, 2LA 7, 2CTF 6, 2AJQ 5, 2DD 5, 2ADH 5.

NORTHERN NEW JERSEY—We all offer our deepest sympathy to 2CJX, who had the misfortune of losing his father. 2ADU will operate 8CHG this summer. 2CTQ is going strong on the higher waves. 2WR, 2CQZ, 2KS and 2AOC are handling Army traffic. 2ABZ is rebuilding. 2GV has installed his transmitter in the cellar. 2AHK had a slight brush with the BCL, which resulted in an inspection by the RI, who gave the station his entire OK. 2CY handled the largest amount of traffic. 2BQQ is moving. 2ZB reports handling very important traffic with 6DCF and 6BVC. 2BAW complains of too many R9 reports followed by a QRM report. 2ALM is a new ORS. 2EY is busy. 2CXY is offering his entire station for sale as he desires to buy a car. 2BZJ is QRW college. 2BUY is QSO Australia, Brazil and all Europe. 2BGI is experimenting on 20 meters. 2CGK was QSO Ba1AC on 20 meters. 2FC has trouble working across the pond. 2ARS is at sea as first op on a coast wise steamer. 2LD lost a 50 which was QSO every continent. 2AMB burned out his MG and is now using a five. 2DX is building a 20 watt fence for 80 meters. 2CP is helping 2JG get on the air with a tube set. 2CQZ is still going strong with his sync on all waves.

Traffic: 2WR 8, 2CYV 1, 2CTQ 44, 2LD 15, 2ALM 16, 2BAW 27, 2ZB 28, 2AHK 43, 2BQQ 2, 2CY 166, 2CDR 7, 2BGI 10, 2FC 1, 2BUY 18, 2CGK 2, 2AMB 14, 2CP 34, 2DX 32, 2CQZ 8.

MIDWEST DIVISION P. H. Quinby, Mgr.

NEBRASKA—Dist. 1—9BFG is maintaining schedules with 6AOS, 6UO, 9AOB, 9AJW, 9ADW, 9ABL, 9AED, 9RK and 9EAM. 9DUH has improved his QSB considerably. 9DUO reports his transmitter completely rebuilt again. 9BYG reports no activity for himself on account of operating at 9DR. 9AJ is on with various sets equipped with tubes from 201As up to 203s. 9CGS surprises us by getting on the air again. 9EW reports working Honolulu with his 210. 9BGK and 9CJT have been quite consistent. 9DXY is very QRW. 9DRY, 9AL

and 9AWS are on. 9BNU and 9DPS report little activity. 9EBL has not been heard as regular as usual. There will soon be two new stations in Alliance.

Dist. 2—9BQR applies for ORS. 9BOQ reports being sick. 9DI has light traffic report but says it will increase as soon as school is out. 9EAK has his regular DX. Short wave set installed at KFAB in charge of 9ANF, 9CIN and 9JK. 9AKS reports he had a scrap with the YL so is back to radio.

Traffic: 9BFG 201, 9DUH 26, 9DUO 1, 9DR 40, 9AJ 7, 9CGS 4, 9CJT 11, 9DI 6, 9EBL 36, 9DPS 3, 9BNU 2, 9DXY 118.

MISSOURI—Dist. 1—9DMJ says he hasn't much time for hamming and then turns in the 2nd largest total. 9ZK put in an emergency set with B battery supply. 9BEQ and 9BHI are building crystal sets. 9DLB is building BCL sets. 9AOT is QRV for traffic. 9DXN is QRX as for some time past. The active gang from St. Louis plan a ham excursion to K. C. Apr. 30-May 1st, returning on the 2d. It is hoped this will result in definite plans looking toward a joint Missouri and Kansas A.R.R.L. Convention some time this year.

Dist. 2—9AJW reports 4 hams now QRV in Joplin. 9AOB visited the gang in Wichita, Kansas. 9EOA is on 170. 9AYK says he is going to quit ham radio for no good reason. 9DNJ has had sickness in the family but is coming on 40 and 170 soon. 9CDF is using one on 171. 9CYK reports double barrel QRM—BCL sets and YLs. 9DIX is QRW school. 9DAE says he's on when he can wake up. 9BUE is on 176 and kept schedules with 5ES daily. 9BSE and 9CXU applied for ORS. 9ARA handled a few messages. 9CVY worked Wisconsin on one with a 210 on 80 meters. Some more hams are reported starting in Pleasant Hill. 9BQS received an ORS. 9DKG kept schedules with 9BSE. 9RT is reported coming back on the air. 9LJ handled a good score of messages. 9AYW is another St. Joe station handling traffic. 9DRW had some traffic. Arc light QRM is still making operation after night miserable according to 9DRW. 9DVF reports quite a few messages on 38 m.

Dist. 3—9BSH is not operating. 9BDS and 9BSH have made several trips to 9DWK and boiled several ovens. 9EEH has been out of town. 9BDS is married and will soon have more time for ham radio. 9BOB was heard operating at 9CZI but no amount of calling could get his attention.

Dist. 4—9RD and 9ZD handled the bulk of reported traffic in K. C. 9ADR lost a 50 watt tube. 9TJ blew up and sold out. 9ACX still working on 40 but all DX. 9RR tried to keep several schedules but they were not uniformly successful due to various kinds of QRM.

Traffic: 9BEQ 32, 9AOT 6, 9BHI 8, 9DMJ 150, 9ZK 100, 9CYK 3, 9CDF 3, 9AYK 18, 9AOB 45, 9AJW 34, 9BUE 8, 9BSE 1, 9ARA 8, 9DKG 23, 9LJ 116, 9AYW 4, 9DVF 25, 9CRM 6, 9ZD 8, 9BND 70, 9CZW 15, 9EEZ 43, 9FF 11, 9RR 106.

KANSAS—9CFI was sick last month. 9DBH still pounds out the DX. 9ACQ has moved to Kansas City and will be on the air soon. 9CVL has good success with his H tube. 9BYI is on 178 and has several schedules. 9DPU is on 40 and keeps 8 schedules. 9RY is on again on 40. 9CV, using an H tube, worked France. 9CET is putting in a 250. 9AET is alternate for 9DPU in Army-Amateur work. 9CKV is a new ORS. 9BLB is on 80 and handled some traffic. 9DHW worked NZ, Australia and Hu. 9BGX is going strong on 40. 9BRD says that all the Newton hams are on 80 meters. 9DRD worked several As and Zs. 9DNG can't get his sink to work right. He and 9CCS attended the Midwest Convention at Ames. 9CCS put up a Hertz antenna and likes it the best yet.

Traffic: 9BRD 3, 9BGX 22, 9DHW 4, 9BLB 13, 9CKV 40, 9DHW 10, 9BYI 10, 9DHF 62.

IOWA—A good share of the ORS of the state turned out for the Midwest Division Convention at Ames. 9EFS reports he handled traffic from Hu6AFF with transmitter on 40 meters. 9DAU reports his wave is 36.5 meters. 9BZE's best DX is 6PW. 9CWG kept schedules with 9DMO. 9CGY has finally managed to get his transmitter to the 80-meter band and wishes schedules. 9DOA reports his QRH is 86 meters. 9DJA reports his QRH is 38 and using the self rect. Hartley. 9HK is using 5 watts. 9BCD is back on 80 meters. 9AXD reports best DX on 100 watts this month as Porto Rico. 9CS reports his wave on 40 meters. 9CS is also helping the RCA by making observations of the signals sent out by 2XK, etc. 9ADX is a new station in Clinton.

9BCD reports that he couldn't make the convention at Ames on account of an empty pocket book. 9CZC has been trying to get down to 40 meters but no luck. 9AED has several good schedules working now. 9BDH has been QSO KFUH, Porto Rico and Canal Zone. 9DMS is now operating with the call 9DIZ the ham set of KOIL. 9LC have their remote controlled transmitter in operation and will be on in full force.

Traffic: 9DOA 88, 9DJA 2, 9CGY 22, 9CGW 1, 9BZE 7, 9DAU 37, 9EFS 24, 9HK 5, 9BDH 28, 9AED 14, 9CZC 69, 9DMS 6.

NEW ENGLAND DIVISION T. F. Cushing, Mgr.

MAINE — The following appointments have been made: 1BIV, 1AQI, 1ABO, 1GO, 1BFZ, 1ADI, 1AWB. Cancellations: 1ZB, 1CPN.

If you doubt the efficiency of Maine's traffic organization, just take a look at the totals this month. No small amount of the credit goes to the Maine Message Pushers Club, organized by 1BIG and named by 1AUF.

Dist. 2—1BNL was QSO his first foreigner, f8JF this month. 1ASR says his bedroom is so full of haywire that he can't retire. Four hams from Portland attended the convention and every one of them copped a prize. 1ADI received his ORS certificate this month.

Dist. 3—1AQI and 1BFZ received ORS certificates. 1ACK intends to spend the summer with Westinghouse at Pittsburgh. 1UL has a whole new outfit on 40 and is QSO everywhere. 1UU has been getting in some good DX on 40 for the past month. 1AXU is going good on 100 watts with pure DC note. 1EB attended the Convention representing the Queen City Radio Club.

Dist. 5—1BGS is on 80 with a phone set for experimental work. 1AUC says it's hard to get traffic around Bar Harbor at this time of year.

Dist. 6—1ATV is now rebuilding both transmitter and receiver. 1BIG and 1KL attended the convention and had a wonderful time. There were ten Maine hams there and they had a whole table to themselves at the banquet. 1IB is QRW the General Electric Co. and doesn't get home often enough to pound brass.

Traffic: 1AAV 107, 1AQI 22, 1ATV 217, 1AYJ 232, 1BFZ 35, 1BIG 247, 1BKX 37, 1BNL 55, 1BUB 43, 1KL 176, 1UU 48, 1OR 19.

VERMONT, 1AJG, ADM — Dist. 1—Things improved in this district. 1YD was high traffic station. FB, gang! 1BBJ is hitting on all fours and QSO 6s and 7s. 1BEB is back on 40 and reports no great DX. 1BD is on the air now and QSO'd the west coast on 37 meters daylight with a VT2 and 25 watts plate input. His outfit is shown in the photo. 1BDX handled a lot of traffic. The northern part of the state is coming along FB. 4 new non-ORS were heard and if they report to 1BDX a few times, they can earn an ORS.

Dist. 2—1FN hopes to be on soon with a new H tube. 1CQM at RPI, won a scholarship for a three year course, PG. 1AC is QSO anywhere and the cards are rolling in FB. 1APU is working out of the state somewhere this month. 1BIQ has gone to sleep.

Traffic: 1YD 73, 1BBJ 17, 1BEB 20, 1BDX 20, 1AC 20, 1AJG 12.

RHODE ISLAND—Quite a number of the boys in the Providence Division didn't report this month but we will forgive them this time as the Convention got them all excited and a little thing like reporting was forgotten. All the boys say that they had a great time and are all set for another.

The ADM was very sorry that he could not be there as he should have been, but he had to stay away to carry on his job.

Dist. 1—1BP is changing his QRA so is off the air just now. 1AFO has a fone on 80. 1AMV has opened up in Cranston. 1AID says she has been QSO with the Flu. 1AWE is using a UV208A with an H and UX210's for spares. 1BCC is running along FB. 1ALD says he has been QRW with his work so didn't get on much. 1DP and 1AHE are still tied up with BCL work. 1ABP reports DX getting better all the time. 1BIE is using a long antenna with a ball at the far end. 1AEI says he will be on more often now.

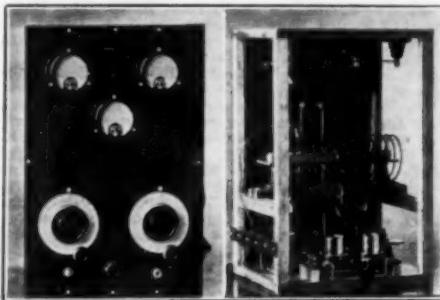
Dist. 3—1AAP, 1CDs and 1QV all attended the Convention. 1CDs, who always was lucky, won the 2d door prize. 1AAP is building a couple of transmitters, one for 40 and the other a fone for 80. 1QV

is using a couple of UV210s and stepping out FB. Not much doing at 1BVB due to "bread and butter" job QRM.

NEWPORT — 1BQD installed a UX210 and works everything. He and his YL took in the Convention and had a hang-up good time.

Traffic: 1BQD 32, 1AEI 2, 1BIE 7, 1ABP 7, 1BCC 23, 1ALD 1, 1AWE 8, 1AID 17, 1AFO 22, 1PB 3, 1BVB 18, 1CDs 1.

CONNECTICUT—We have passed through a wonderful period when we realize that distance has been



conquered by the amateur who has persevered and brought his station up to efficiency and the future must, of necessity, bring him even greater success.

1ADW says power leaks put him out of business so he hopes to form a radio club to put the leak out of operation. 1CKP doesn't find traffic very heavy so makes up for it with DX. 1BHM worked Chile and has been in contact with Europe twenty-one times during the month. 1BGC didn't like his borax rectifier so made a good one and communicated with Belgium to prove it. 1ZL experimented with a Hertz antenna during the month but still likes his old flat-top as much as ever. 1MY believes his transmitter can behave best "down where the corn and 'taters grow" so put in his cornfield and uses remote control. 1CTI reports hearing KEGK and is working hard to get on 40 meters. 1IV attended the Convention and from his description it must have been about the best yet. 1AOH hopes to be on the air while he is at home for a short vacation, but is working hard at present to get his M. A. degree. 1AVX has received an Army Station appointment and is experimenting with phone on 80 meters. 1AOX is tubeless but not dead, although he reports one of his feet went on a strike. 1SZ has been having tube trouble. 1VY reports DX as very good.

Traffic: 1ZL 2, 1CKP 9, 1ADW 37, 1BHM 24, 1BGC 11, 1HJ 14, 1MY 21, 1CTI 3, 1IV 26, 1SZ 16, 1VY 29, 1AXN 46, 1BLF 2.

EASTERN MASSACHUSETTS — Dist. 1—1BZQ is changing his QRA. 1LM is the star traffic station this month. 1NV is building a 60 foot lattice work tower. 1ACJ is going on 40 meters. 1BBK has spent most of the month getting his transmitter tuned to 40 meters. 1CJR hooked up with KEGK and handled some traffic with them. 1JL has been doing some good DX. 1AOE has been QRW with school and YLs.

Dist. 2—1AHL is experimenting now and getting ready for better DX. 1NT's transmitter raises the 6s but his receiver won't detect them. 1UV can blow fuses in the local YMCA when he can't work DX. 1ACI's transmitter seems to be in a slump and doesn't like to work in the early morning. 1BBM is back with us once more and has his transmitter going on 40 meters. 1OU is rebuilding again. 1YC still continues to handle plenty of traffic. 1AXA has a crystal control set peaking on exactly 39 meters. 1AVY is still pounding out. 1SL was heard in Germany on 79 meters. 1ABA, with his peanut tube outfit, is still getting out. 1ALP shortened the leads of his rectifier and worked Europe the same day. 1BAT has been so QRW school that he hasn't had time to be on. 1BVL is getting out FB as usual. 1RF says his sigs are only heard round Boston. 1RR still has time to push the key and work DX. 1GA worked A-3BD in the PM on the 40 meter band. 1ALA worked Europe nine nights in succession. 1AHX has a new 208A getting out FB. 1AWB has joined the Army forces. 1ADM get on most week ends now.

Traffic: 1ACJ 6, 1AEO 18, 1BBK 7, 1BZQ 31, 1CEA 8, 1CIT 2, 1CJR 40, 1JL 108, 1KY 66, 1LM 175, 1INV 28, 1WWD 18, 1BMS 66, 1AVY 14, 1AXA 8.

1YC 83, 1OU 6, 1BBM 2, 1AWB 27, 1AHL 1, 1NT 10, 1ACI 20, 1AIR 6, 1RF 5, 1BVL 6, 1BAT 1, 1ALP 10, 1ABA 12, 1SL 23, 1RR 1, 1GA 19, 1ADM 2.

WESTERN MASSACHUSETTS—Dist. 3—1ARE is dusting off the old ether buster for summer activities with some of the expeditions. 1AMZ has daily schedules with stations in all directions. 1AAE has installed 6HM's circuit and is knocking holes in the ether. The skating rink in 1CLN's shack is disappearing and he will soon be on again. 1AMS has installed a 50 watt and is working DX stations at will.

Dist. 4—Springfield is turning BCL. The Radio Assn. has invited BCAs to learn the code. 1BLU has moved to Boston. 1AWW reports QRW from work but manages to keep the dust off the key.

Dist. 5—1AOF has been ill. 1BOM has joined the ranks of the married men. Poor thing.

Dist. 7—Worcester County is quite alive although only a few stations are continuously active. We have three new ORSs in the stations. 1BIV, 1GR, 1AJK. 1DB is on 80 meters every night. The BCAs like 1ASU's antenna wire very well and remove it from his stick frequently. 1AQM is quite busy and finds little time for radio. 1AAL is running two transmitters, one on 40 meters and the other on 80 meters. 1ANP and 1ANE are new stations in Worcester. 1AKZ is still cutting holes in the ether. 1BDP worked Australia. 1ABY is using one on 170 meters and is working 1500 miles. 1BBP, 1AJM, 1BAL are all on.

Traffic: 1AWW 8, 1APL 6, 1EO 20, 1AMZ 149, 1AAE 57, 1AJK 1, 1AAL 6, 1XZ 1, 1DB 7, 1AKZ 46, 1ASU 19.

NORTHWESTERN DIVISION

Everett Kick, Mgr.

7EK was QSO with South African O-A6N some 11,000 miles, which is believed to be the first communication from this district.

WASHINGTON—7FD, ADM—Spring evidently turns a young man's thoughts to something other than radio from reports for last month. 7BB leads the Division for traffic. 7AFO works As and Zs on schedules. 7DF, 7GB, 7TG, 7UO and 7AW report good traffic work. 7AFB and 7BY have shipped out as commercial ops. 7TT and 7AD, ex7AAX are going up north to pound brass at canneries. 7AD will be on the air soon. 7CY shot his third H tube. 7AIM, 7RL, 7UL and 7WQ are increasing power. 7GE is on with a 250. 7AIB, using an H tube on 80, reports good DX. 7NH works As and Zs on a 7½ watt. 7DC is rehashing his rectifier. 7UQ and 7OT are rebuilding. 7AG, 7NL and 7HO are on. 7PK and 7TX are new Seattle stations. 7DU gets out well with two 201A tubes. 7BO also does well. 7CS works As and Zs with a 210. 7VV is on occasionally. 7AAB is a new Everett station. 7GY and 7PZ have consolidated and are now 7VK. 7VL gets out using his counterpoise as antenna. 7OB is a new Spokane station on 40 and 80. 7AF will be back with us soon. 7IJ is a new station at Opportunity.

Traffic: 7BB 148, 7EK 97, 7AFO 62, 7GE 53, 7UO 30, 7DF 27, 7GB 25, 7TG 16, 7AW 15, 7ABF 10, 7NH 8, 7RL 6, 7BO 6, 7OY 5.

OREGON—7IT, ADM—Traffic took quite a slump this month. 7UJ will be on steady soon. 7AY, on account of poor health, is at the Open Air Sanitorium at Portland. 7AA added Chile, Tasmania and Alaska to his DX. 7SY is getting out real well. 7HB and 7OZ use KFUH circuit with H tubes. 7OK says if his H tube doesn't show some pep, he's going to use it as a detector tube. 7AKH is on occasionally. 7EO rebuilt both transmitter and receiver. 7AEK handles a lot of QTC with HU. 7PP is still off but when he comes back, it will be to handle traffic. 7LQ is rebuilding. 7FE has a new piotron. 7ND pushes out a tremendous AC sig. 7KY has a UX210 to replace his 5er. 7MF sent in a fine report for 7ACM who has been ill with smallpox. 7QJ is a new station reaching out well. 7NZ is having trouble with his transmitter. 7LS and 7MF set up a 50 using AC for plate supply at their High School. 7RW is contemplating a low power transmitter.

Traffic: 7AEK 41, 7OK 21, 7SY 16, 7AJQ 8, 7EO 5, 7IT 1.

IDAHO—ex7OB, ADM—7YA has schedules every day handling air mail traffic. 7PS was going fine with a new 50 watt when he blew his plate transformer. 7ST is starting up with a 4d coil on a 201A. 7BT is the chief op at 7YA so doesn't pound brass at home. 7PJ has gone back to Alaska. 7GW reports ND for too much sunshine. 7JF is using a

Hertz antenna with extra good results. 7ZN is on some when he can't see to play tennis.

Traffic: 7YA 60, 7JF 41.

MONTANA—7NT, ADM—The ADM is making a business as well as pleasure trip through the East and reports having a wonderful time. 7PU is the top-notch this month for breaking the old gag that DX couldn't be worked from Montana. 7ACI is inactive on account of deceased bottles. 7DD has a lo-loss transmitter in construction. 7ZU still reports heavy school QRW. 7AGE will be going as soon as he gets a new aerial working. 7FL is studying hard for he is expecting to graduate. 7BI would like a schedule with someone to send to him for code practice. 7JX uses a UX210 on 83 meters.

Traffic: 7PU 48, 7JX 20, 7DD 3, 7BI 1.

PACIFIC DIVISION

P. W. Dann, Manager Northern Section

THIS is the last report that the present Asst. Communications Manager for the Northern Section, Pacific Division, will forward to Headquarters, as my appointment expires April 30. I wish to take this opportunity of expressing my thanks and appreciation to ALL of you who have made the Northern Section what it is today. If you give my successor the same undivided support that you have given me in the past two years, the N. S. will be one of the largest in the Pacific Division.

Probably the most interesting achievement last month was the five day tests at Mt. Hamilton, conducted by the Santa Clara County Amateur Radio Assn. A message for the Chilian Observatory was delivered half an hour after receipt at experimental station 6SV. The answer to this was received by 6CKV last week. 6APS, 6CKV, 6AMM, 6BON, 6NX and 6OI are on the job every day. 6NX spent most of the month checking waves of amateurs and sending out cards to those below the band. 6BON is bothered by bad power leaks. 6CKV is handling traffic with Chile for the Lick Observatory. 6AMM has schedules every morning. 6OI put in 250-watt and worked 0-1SR in Rhodesia, South Africa. 6BMW worked Chilian 3IJ and NGY-NQY in China. 6APS is another Meissner man and putting a terrific signal into Australia and NZ. 6CEI just got a Commercial ticket and is back home pounding again. 6ALW is one ham that hasn't let Super DX get the best of him. 6AIH is QRW school. 6CLP is second highest traffic man. 6BVY has schedules with 7AY, this being a Naval Reservist and Army Relay Station. 6CIS has moved his set to Yosemite for the summer. 6CUL has changed from a fifty to a five watt.

Dist. 6—Adams advises things are slow around Eureka, as 6SA is off the air on account of remodeling his set. 6BWR is also remodeling and is going to use copper tube inductances. 6BAF received the belated replacement on his 50-watt and of course is pleased.

Dist. 7—Nevada—6UO, the only one reporting from Nevada, says there is very little activity, as the gang up there seem to have lost interest since the contemplated change in organization was announced.

Traffic: 6UO 38, 6CJD 3, 6CIS 14, 6CCY 8, 6BVY 23, 6CLP 52, 6ADB 3, 6NX 9, 6BON 12, 6CKV 15, 6AMM 80, 6OI 17, 6BMW 21, 6APS 30, 6ALW 4, 6AIH 2.

Southern Section

L. E. Smith, Manager

This month the gang held the biggest of any of the A.R.R.L. banquets yet held in the Section. Mr. Babcock journeyed down from Oakland to speak to us. The coming change in the traffic department was discussed and explained so that all might understand. A good time was enjoyed by all.

Dist. 1—6HU reports working BAM at Paete, Tahiti. 6AXU and 6AOY are new stations in Santa Ana. 6AOY is a 250-watt installed by 6APP, 6CGO and 6OP. 6EC says that U. S. mail is the only traffic route into Los Angeles. 6CHS has just returned from an op job on a tanker. 6AJM worked 3JWW at Kobe, Japan, with a 7.5 watt. 6BQ keeps schedules with several p. l. and u. stations. 6SB reaches England regularly. 6ZH is now one of the ops at a new 1000-watt B C station. 6OP, 6CNK, 6CGC, 6BAS all threaten to get on the air soon.

Dist. 2—QRN is getting so heavy on 80 meters that most of the stations are being forced to drop to 40. 6AE's set doesn't suit him. 6AFG is QSO hu often. 6BBV works 'em all from his new QRA and is putting in a 500-cycle MG. 6BCS has a portable set on Santa

Rosa Island. 6BHI is a new ORS on 40 meters. 6BJD keeps schedules with uu and pi. 6BJX is going to take a portable set on his vacation and try to keep his schedule with pi on 10 watts input. 6CAH filters his sync and gets pure DC. 6CND is an op at KSMR now. 6CTO reports trying a Hertz antenna. 6DAH is on with a 7.5 watt. 6IH is suffering from a soft 50. 6UT says he can't work



Miss Flora Turner 6BXA

YLs and radio at the same time. pi-1CW is going strong with a flock of schedules. 6CGK is reported to have a mysterious schedule with a certain WI at sea. 6CAE has been QSO all continents but Europe, with his 50. 6AJI is getting better after getting rid of a big stick and a flock of guy wires. 6RN worked pi and Japan. 6ML is now 6BXD. As a result of his training, his YL now has a license and will soon be on the air. 6BLS has a message at the local American Legion post. 6CQA has finished his new transmitter and is doing good work. 6AHP is taking traffic from pi. 6BUR can't keep on the air and be SM and go to college at the same time. 6BUW is experimenting as usual. 6CSS has fallen for the YLs but promises a comeback. 6CIX has a new Chevy and we suppose will turn sheik now.

Dist. 3—6BAV is the new DS. 6BVM is handling traffic on 80. 6KB, 6AJJ and 6BAV are on every am. Some new ORS are promised soon.

Traffic: 6AE 12, 6AFG 61, 6BHV 37, 6BCS 10, 6BGC 20, 6BVG 3, 6BHI 20, 6BJD 82, 6BJX 355, 6CAH 11, 6CSW 84, 6CTN 75, 6DAH 6, 6IH 2, 6RF 40, 6UT 4, 6BC 23, 6DAA 18, pi-1CW 326, 6CGK 11, 6CAE 21, 6US 10, 6BVO 16, 6ANI 27, 6RN 40, 6ML 97, 6BBQ 50, 6BLS 109, 6CMQ 68, 6BTM 80, 6AKW 8, 6CQA 10, 6AHP 38, 6CSS 2, 6BUW 18, 6HQ 175, 6AJM 121, 6SB 9, 6BAS 5, 6CGC 3, 6NW 9, 6HU 8, 6APP 5, 6EC 8, 6BVM 7.

ARIZONA—The ADM, 6ANO, is now busy on a cattle ranch but 6AMW is keeping the set on the air. 6CUW is still knocking 'em over, having now worked So. Africa. 6CBJ says he can hear 'em from all over the world using his 300-foot receiving antenna. 6YB works everything possible. 6ARX gets out well. 6DCQ is a new station. 6RS is still doing his stuff with the traffic. 6AMW, 6BTV, 6AMZ, 6PZ and 6GS will be on soon.

Traffic: 6ANO 149, 6CUW 185, 6CAP 40, 6YB 8, 6CBJ 28.

Hawaiian Section K. A. Cantin, Manager

Due to an epidemic of BCLitis local amateurs are being accused of causing considerable interference to the broadcasting fans. The matter is being handled by an Interference Committee but it is hard to convince the BCL that the amateurs are willing to cooperate and eliminate interference—providing they are causing it.

Message delivery from Hawaii to the mainland is very disappointing due to the lack of delivery. Please, fellows, make an effort to relay or deliver messages from the Hawaiian Islands.

6BUC broke all local records for traffic handling, and is voluntarily observing the quiet hours. 6AFF had trouble with his 250 watt tube. Established contact with pi-CD8 and 1HR. 6CLJ with a power input of 38.5 watts worked South Africa O-AB. 6CFN is working with 800 watts input—contact was established with G-SLK. This is the first time that local stations have communicated with England. 6BDL, another new station in our ranks, has established communication with pi-JAA and 2AMG.

6CST using 500-cycle is putting out an excellent signal. 6TQ confines his work to the 6th district, Australia and NZ. 6CFQ, with a ten watt, is going after the Australian and New Zealand stations. 6ASR is about QRV to test his new 500-watt CW and phone set. 6ASE left for a trip around the world. On reaching Calif., the first lap of his trip, the sign of all the amateur sets made him homesick. He is back in Honolulu again. 6OA, 6CMH and 6DBL are on the air occasionally. Capt. Adams and 6DCF working at FX1 have been experimenting with phone on the low waves. Using phone, contact and communication was carried on with KFUH, who was somewhere near New Zealand. Contact was also established with NKF.

Traffic: 6BUC 292, 6AFF 87, 6CLJ 42, 6CFN 37, 6BDL 36, 6TQ 22, 6CST 14, 6CFQ 13, pi-3aa 125.

ROANOKE DIVISION W. T. Gravely, Mgr.

WEST VIRGINIA—8ALG got R-9 report from New Zealand. 8AUL worked f8ZO and f8BX several times. 8CDV is handling nine-tenths of the messages and getting them through too. 8BSU is experimenting with SAKZ. 8BSK is coming on again on 40. 8DOH is a new station in Wheeling. 8BJG worked 7RU and 7OK, using one UX-210 with 4 watts input. 8BXP, 8AWV and 8CYR are very active. 8ALG is contemplating big tubes now. 8AMD says he has a 2 ampere YL! The Huntington Transmitting Amateurs Club claim the call 8BFW. 8AMD is experimenting with crystal sets. 8SV has schedules with 8GZ. 8IT is operating on a steamer on the Lakes for the summer. 8SP and his pardner 8CSR are going good. 8CSR and 8ACZ are new ops. 8CSR is visiting Wheeling. 8ZW will probably be on the air soon. 8ZW is in Florida overhauling a BC station.

Traffic: 8SP 14, 8AUL 17, 8CDV 37, 8BSU 8, 8DOH 2, 8BJG 21, 8BXP 3, 8CBE 68, 8AMD 13, 8SV 51, 8AYP 283, 8DRR 32.

NORTH CAROLINA—Dist. 1—4RF has been appointed an Army Amateur Station.

Dist. 2—4TS has been experimenting with BCL sets. 4MI has had the "flu" for a month. 4GW lost his ORS for not reporting.

Dist. 8—We are very sorry to lose one of our best stations 4TJ, now operating at WDBO. 4BX has been experimenting with antennas. Both operators at 4AC gave 4JR the once over. 4JR continues to handle a lot of traffic on schedules.

Dist. 4—4RW has QRM from school work. 4WE has a new 70 foot cage and a new power supply. 4NT has a 201-A.

Traffic: 4TS 11, 4MI 67, 4BX 19, 4JR 180, 4WE 4.

VIRGINIA—Dist. 1—3MK is keeping schedules with 3CO. 3CKA now operates on 80 and 40. 3QF worked KECK. 3AHL is using a five watt till his "H" tube arrives. 3SB has dissolved partnership with 3AHL. 3TI is still working as usual.

Dist. 2—3BMN is coming back on the air with a bang. 3ATB is just back from Miami. 3AUU is QRV with shop work. 3NO is working hard to get the xmitter going. An active radio club is now operating in Richmond. Seems there is some life in Richmond and we have a report that a flock of the old timers are coming back. 3MO and 3TJ will be back on the air shortly. 3AJR hasn't pounded the key since he came back from the hospital. 3AEV worked 7GV using one fiver. 3AIK is erecting a sixty foot mast.

Dist. 3—3IW on again using remote control and break-in. 3KG has been logging quite a few foreign stations. 3AAI is on the air at present. 3BGS is working on 39 meters. 3RX has schedules with 4TG every Sunday afternoon.

Dist. 4—3CKL has made a trip to Washington but no report as to whether he got in jail or not. 3BZ suggests the Division adopt a standard wave for division communication. 3CA was QSO 4DA for the first time in three or four years. 3BDZ is hitting the high spots.

Traffic: 3CKA 18, 3CKL 57, 3RX 2, 3IW 6, 3BGS 12, 3MK 48, 3QF 74, 3AHL 6, 3TI 6, 3CA 0.

ROCKY MOUNTAIN DIVISION N. R. Hood, Mgr.

COLORADO—9QL has been working hard. 9CAW reports he is getting through to NZ and Australia regularly now. 9WO shot 3 S tubes and what was once a perfectly good high voltage transformer. 9CAA reports that things have improved as to QSR west on 50 meters which is his normal wave. 9CDW

works out good now with his $7\frac{1}{2}$ watt. 9EAM is still hitting high with the traffic. 9AJQ discovered it isn't always the YL who walks home. No, you got him wrong. He took the YL home but when he decided to go himself, the cars had quit running out where he lives and he walked 4 miles, in a snow storm to get home. 9DQQ is busy running a broadcasting station. 9OO gets his report in just as this is being written.

Dist. 1—9DVL is rebuilding. 9DEU reports that he kept his family in touch with the condition of a relative in Los Angeles during a serious illness. 9AOI is rebuilding.

Dist. 2—The D.S. reports that the gang are not reporting regularly. 9CHD says that the thrill a 5 watt got out of its first weeks working DX must have affected its heart, as it died very suddenly. 9DZY will probably leave the state in the near future. A couple new stations are expected on the air soon. 9DUI learned along with a couple of other Denver hams that it costs money to ride in a taxi.

Traffic: 9AD1 60, 9DFH 8, 9CDE 49, 9CHD 1, 9EAE 10, 9EAM 30, 9WV 15, 9CAW 7, 9QL 2, 9OO 58, 9CAA 119.

UTAH—6CVA is a very active station. 6FM reports moving his transmitter to a new radio shack and is building an additional phone set. 6BTX keeps schedules with 9CAA and 6AJP twice weekly. 6BUH and 6ZT have been too busy with other work to handle any traffic. 6CRS's transmitter is doing good work on 42.2 meters. 6RV heads the list for traffic handling this month.

Traffic: 6BTX 71, 6CRS 8, 6FM 7, 6RM 6, 6RV 143.

SOUTHEASTERN DIVISION A. D. Trum, Mgr.

PORTO Rican hams are doing splendid work with foreigners. Florida hams are coming back with stamina and vigor never heard of before. Georgia is the home of wide-awake DX hounds. South Carolina is doing its share. Alabama hams are the cat's whiskers. Alabama lost one of her best amateurs in SAC who went aboard ship for a while.

PORTO RICO—Atmosphere conditions in the present month have not been of the best and our gang is having difficulty at steady communication with Europe and the Mainland. 4KT has done the best work handling most of the U. S. Traffic. 4SA has done most of the South American and European message handling. 4JE, 4BJ and 4UR have all been doing their bit to boost our traffic total.

Traffic: 4KT 18, 4SA 16, 4JE 10, 4UR 9, 4BJ 3, 4RL 2.

GEORGIA—Georgia Tech Radio Club is going strong and is now an ORS. 4AV has 6 good ops ready for traffic all the time. 4AAD works France, England, and Australia regular. 4AAE is piling up a long list of DX on a 7.5er. 4CC, portable of 4RM, worked c3GG on a 201-A, with 2 watts input. 4FC is now with the Power Co. and has a 250 on 20 meters there. 4GO is the lone and low power station of 4AAE. 4HW is still expounding theory for "Dad" Willis at the Power Co. 4IO has been sick but is back at the key again. 4KV is now on fence on 80 with FB signs. 4MC, portable of 4AAD, is making a good record. 4KW is bursting holes in the ether with a 5er. 4OA is heard occasionally but is about out of the game. 4PX is a new station. 4RM is about the same as usual. 4SI is the most consistent station in town doing good DX. 4XJ is the new station of the Ga. Ry & Power Co.

FLORIDA—Our new ADM is just getting acquainted with the boys and says he is going after good operating, fine traffic handling and rag chewing. He is going to make Florida the best state in the S. E. Div. 4DM did fine work this month. 4BL has been on 40 most all the time. 4QY just made himself a new B-T receiver. The following are on regular: 4DD, 4WB, 4BL, 4DF and 4UA. On account of the change in ADMs in the past few months, quite a few good reports failed to get in. All stations in Florida are requested to send in their reports to Mr. Grogan of 4QY. 4OB is working fine. 4TV is still with us when he has time.

Traffic: 4OB 79, 4TV 1, 4DM 79, 4BL 82, 4QY 34.

ALABAMA—The ADM has been exceedingly busy with business this month. 5ARJ is QRW with school. 5QP blew a perfectly good plate supply due to misplacement of some of the wires. 5ACM works out on fence FB. 5ACM seems to have lost interest. 5GP will open a set of his own at Auburn this summer. 5AWF is rebuilding. 5AX is the most consistent station in Birmingham. You can hear 5VV calling

and chewing the rag most any time. 5AMH and 5UP are heard once in a while. 5AC was on the air more than any other Mobile ham this month. 5AC offered a prize to the station handling the most traffic this month. 5DL won it. 5DL shot his H-tube and was only on one week this month. 5LC shot his plate transformer and reports ND. 5QF is still on with his fever. 5QF also handled a message this month. 5QK was not on much on account of his OM having to sleep in his room and can't stand the clicking of a relay. 5AC-QF has erected a portable set on 40 meters under the auspices of the AJAX Athletic Club. 5AAD heard 11GW. 5AR has been pretty busy lately and hasn't had time to do his stuff. The boys in Montgomery have just finished fixing up a club set at 5NL's house. 5ADA is working on all bands. 5AJP is heard often working 40 meters but says that 80 is the best working band. 5ATP was laid up two weeks with the mumps. 5DI and 5WI are pounding the brass at 5YB.

Traffic: 5AC 18, 5AAD 4, 5ADA 50, 5AJP 20, 5ATP 20, 5AX 51, 5AWF 10, 5DL 21, 5QF 1, 5QK 10, 5VV 14.

WEST GULF DIVISION F. M. Corlett, Manager

NORTHERN TEXAS—The report for this section was lost!

SOUTHERN TEXAS—Activity has not been so great this last month. Traffic figures seem to decline. 5MS reports that he has handled no traffic due to building a new shack. 5HS and 5VL visited the ADM Sunday. 5HS has borrowed a chemical rectifier and is back on the air. The RI paid San Antonio a visit recently and complimented the Bexar County Radio Assn. for their good work. 5ZAI has rebuilt his set using a tuned plate and grid. 5APM has also been moving his shack.

Traffic: 5EW 2, 5ZAI 30, 5HS 4.

OKLAHOMA—Springtime, fancies, the old fishing hole and numerous other diversions have crept in and reports were somewhat lax this month.

Dist. 1—5AGN reports very bad QRM from school. 5APG worked As and Zs three times with his new UX210. 5AAV works consistently with the far east. 5APG and 5AAV have been working on a group of photographs of Oklahoma City stations and hope to have them in QST soon. 5ARQ, 5ASW and 5AVT are bent on putting Newkirk on the map. 5ANL, 5VH, 5ADO, 5ASK, 5DQ and 5ATO recently passed amateur first grade examination with an average of 85%. 5AFC is now QRW at Ponca City. 5ADO-AML is very QRW with school. 5ABO is on frequently now. 5ATK is off the Yls for life and is getting the old wreck back on the air more frequently. 5SW spent most of his time trying to run down a "hot check" 5VM gave him. 5ATO is a fireman and sometimes has to QRT right in the middle of a message to put out a fire.

Dist. 2—5GJ has been doing his stuff with a 5er while waiting for the big Esco M. G. to arrive.

Dist. 3—5JU appears to be the only station operating.

Dist. 4—5ED-5AVF is busy trying to get his station working decent. 5AJM reports traffic dull but plenty QRM from YL. 5AGO has been doing some good work. Rumors are flying thick and fast that 5VM has gone to Old Mexico. Before the present ADM fades out of the picture, let's have at least one more keen report for next month.

Traffic: 5APG 12, 5SW 20, 5AGN 6, 5ADO 2, 5ANL 31, 5ATO 23, 5ABO 16, 5JU 15, 5ED 5, 5AJM 10.

CANADA

MARITIME DIVISION W. C. Borrett, Manager

ARRANGEMENTS are being made in the Division to reorganize on the Section System with each Section Manager reporting direct to the CGM. It is hoped that with this system that each section will show more pep and try to beat other sections out in the matter of members and traffic or communications activity. 1ED put over a nice bit of work by means of a schedule with a Boston amateur reporting the result of the Boston Marathon Race in which his fellow townsmen distinguished himself by winning the race. 1CX and 1DM are the two other CB stations working mostly on schedule. 1BZ of PEI is on with a strong signal on 40 meters. 1AI the

DC gent has three schedules with USA hams and complains of lack of 52 meter signals. All NB stations are on the air but little traffic. 1DD has QSO'd two more Europeans on 52 and has schedules with c8WM, who with B-battery 200 volts works 1a, 2a, 3a, 5a and 4a in USA. SAR reports working England 47 days out of 100 and has heard all kinds of strange ones. The Maritime Convention was held in St. John and a report will appear in the editorial space of *QST*. This traffic report may seem small but until we can get more members we cannot get more space. Listen for 1DD at 7pm Saturday and Sunday on 55 meters for weekly *QST*. 1AK stands out this month working Denmark, France, Portugal Italy and New Zealand, in one week.

Traffic: 1DD, 9, 1AI 8, SAR 4, 1CX 3, 1ED 3, 1AK 31.

ONTARIO DIVISION W. Y. Sloan, Manager

GLISTERING INSULATORS ANGER NEIGHBORS WHO MAKE HAM REMOVE OFFENDING SPARKLERS. AMATEURS ASSIST DURING SLEET EMERGENCY. INDOOR AERIAL AT 3FC WORKS HAWAII TWO-WAY. ANOTHER ROTAB INITIATION TO BE HELD. 9AL WORKS BYRD ARCTIC EXPEDITION.

CENTRAL ONTARIO—3WG writes that he cannot get out any more as he is so surrounded with BCL aerials which seem to have a shielding effect. We had great hopes when 3DS came on the air again, but he has neither been able to write or work the set lately on account of scarlet fever. The activity in Toronto certainly saves the situation for the district. 9AL again takes the lead in communication with Arctic boats by working the Byrd Expedition, KEGK. His contact with f8RPB marks the first communication of the year from here with France. It has been extremely difficult to work Europe until recently this season, the Aussies being heard much more frequently than the European amateurs. 3EL stepped out with the messages and further distinguished himself by his emergency work during the recent sleet storm. 3CK is a typical Toronto station—low power, Hertz, 52.5 meters and the odd bit of traffic. 3MV is our star station for the month, having worked England, Porto Rico, Mexico and Newfoundland. He is candidate for ROTAB membership. The Toronto stations did great work during the sleet storm that brought down practically all the telegraph wires. 3FC lost his aerial but rigged an indoor one and proceeded to work California, Hawaii and Australia with it. 3FC works consistently with c1AR on 20 meters. 3BR, 3AJ, 3BL, 3BY, 3AZ, 9AG and 9BJ are other locals that are heard pounding away early and often.

NORTHERN ONTARIO—3GP has arrived down on the short waves at last. 3HP has had to take down his antenna system, because the neighbors who are all ardent BCLs, objected to the reflection of the sunshine from his plate glass insulators. 3NI has lost his second op but it took the Aurora to interfere with the regular schedule with 3FC. NI kept the hocky fans posted during the playing of the final game of the amateur championship of the world which was played at Toronto. G5AX reports 3NI R6 on the 20-meter band at 19.00 GMT.

EASTERN ONTARIO—3XL has secured his ticket and is all set to sail the briny. 3DO has an H-tube perking and in addition to leading the Eastern Division in traffic, has worked some foreign stations. 3MP is also working DX with an H-bottle. BCLs are on the track of 3KT whom they blame for poor reception. Suggest they page Mr. A. Borealis who has been active on super power. 3XM is suffering an attack of YLitis. 3JL sounded the last post over another fiver.

SOUTHERN ONTARIO—3ADY is contemplating taking the drop to 40. 3ABG is reaching out fine on his 50. 3ACO is selling out. Who is she, OM? 3DH leads the traffic bounds again. 3DU has a real tuner and can now say "Nil Hr" in ten languages. 3FU has a fiver on 40, and a fifty on 80. 3GX is ex 3UJ of British Guiana fame. New live-wire ham club in London. 3GY banging away on 20 and 40. 3IA QRW but coming back on low power. 3MF thinks a diet of 4400 would agree with the fifty better than the 2200 he is now feeding it. 3TB is also selling out. 3VW says 40 meters is not up to the label on the bottle. Lost strayed or stolen—none other than old 3KL. 3ZD is QRW school work. 3ZB lost his bottle. 20 meters proved too much for it. c1BV is now with the St. Catherines gang. A real ham from a real ham town—Halifax.

QST FOR JUNE, 1926

Traffic: 3BEL 60, 3FC 53, 3CK 35, 3MV 22, 9AL 23, 3BY 21, 3BR 19, 9BJ 21, 3BL 9, 9AG 8, 3AZ 6, 3AJI, 3NI 58, 3DO 73, 3JL 44, 3AFP 23, 3KT 11, 9CC 6, 3DH 21, 3ABC 11, 3KA 6, 3ZB 2, 3FU 1, 3KP 1, 3ZD 1.

QUEBEC DIVISION Alex Reid, Manager

THIE Old Ham fever seems to be spreading, there will be four new notes on the air shortly. Spring seems to have dulled the old game somewhat, but 2CG, 2AL, 2AX, 2CB, 2HV and 2BE are still working hard for traffic and DX. 2CG has a schedule with 2AC Wednesday and Saturday nights and carries on tests on various wavelengths. 2BE worked a BZ and Z station. The Westend Gang have formed a new club and are collecting funds for the erection of an up-to-date shack, where technical meetings and Ham-fests will be held. During the recent storm in Ontario when all wires between Montreal and Toronto were down for some days, 2CG and 2BE pushed through some real traffic and handed information for the Press. 2CB and 2AX have been carrying on some fine experiments with a portable transmitter and receiver and have interested the Gang to such an extent that we understand most of the boys who own flivvers will equip them with portable sets this summer. 2CN is going out of the game and is selling his valuable equipment. 2BG is moving so we will miss old Tommy's fist for at least a month. The DM would like to have applications for ORS certificates and applications for two OBS stations.

PRAIRIE DIVISION F. E. Rutland Manager

SASKATCHEWAN—Some fellows in this district can't seem to learn to write or else have paralysis. 4AL is putting 350 volts into a Myers dry-cell tube and is QSO Toronto and the 1st U. S. district. 4AC is also putting a fine signal in the air and was QSO Toronto every night for a week. These two stations are working schedule on 160 meters and invite others. 4FA is working FB on 80 meters with 4AQ. Both of them with 201A's and 200 volts on plates. 4AQ is working 1000 and 1500 miles consistently. He worked 12 stations in one night. He thinks he is using too much power and is changing to a 199 tube. 4FA got a QSL card from g6CJ and his hat no longer fits his head. "Dad" Maynard of 4CB has worked c1AR and c1EJ and is trying 20 meters. 4AV is married. 4AO is on occasionally on 52.51 meters and is gradually getting his 250 bottle in shape. 4HH is on consistently with 250 watts. 4BF is going strong but finds 600 volts rather meagre for his H-tube but gets R5 on 20 meters in Los Angeles.

Traffic: 4HH 15 4BF 8, 4AQ 11, 4AC 11, 4CB 8.

MANITOBA—The gang are showing much more pep but still a lack of stations working on 52.51 meters. Several stations failed to report this month, and are warned that two such failures mean a cancellation of their ORS certificates. 4DE has been experimenting with various types of antennae and has little traffic to report. 4DY has a regular schedule with e3NL. 4EA's traffic total is small. An old-timer 4DT, has opened up again and is on 40 meters and works consistent DX. 4DF has at last got his 10 watter to perk with a good note on 40 meters. 4AW is working with a UX210 and S tubes and is looking for some schedules. 4BT hands in a nice traffic total. He is minus a tube but will be QRV when he gets a UX210 delivered. 4AD has opened up with 10 watts. 4DU is using AC supply while getting a rectifier lined up. 4EH has rebuilt his set and has erected a new antennae. 4DW works on four wavelengths with very good results. He handled a third word message from the Mayor of Chatham. 4DY will carry on with the OBS while 4DE rebuilds.

Traffic: 4DE 6, 4DY 26, 4EA 8, 4AW 4, 4DW 14, 4DF 2, 4BT 42.

VANALTA DIVISION A. H. Asmussen, Manager

THE DS for Vancouver district complains of inconsistent operation of the stations in his district but 5CT manages to keep schedules and therefore has the best traffic report in the Vancouver district. 5GF reports 52 meters FB. 5AS threatens to go back to 80. 5GO is stepping out FB, having landed on the third harmonic and should be the next appli-

cant for WAC honors. We hope to have two more stations reporting next month—old 5HG and a newcomer. 5HK having been laid up with a bum arm, is again going strong on 40. 5AW is stepping out FB with 201-A's. 4CL reports being QRW getting the family PHORD in resonance. 4AH is going strong and sends in a fair message total. 4AK paid the DM a visit and expects to get out better soon. We have a new comer at Medicine Hat that should be stepping out by the time this gets into print. 4AF tops the division in traffic handled working on both 40 and 80. 4AL's traffic suffered due to the loss of a stick. The OW at 4DQ keeps the OM busy charging bats and hands in a fine message total. 4GT got his WAC certificate but hasn't been on much due to OIL. 4IO managed to run up a better traffic total this month and keeps a schedule with the coast twice a week. 4CC and 4CG are moving a little traffic on 40 meters. 4AG finds time to do a little operating on the key and the mill. The AREA gang have novel QSL cards—have you received one?

Traffic: 4AF 25, 4AH 4, 4AL 6, 4DQ 10, 4GT 4, 4IO 12, 4CF 5, 5GO 8, 5CT 10

Late Reports

5DW is on 20 meters. 5OT will be on about June 1. SAOR is on 80 meters. 8BQA worked GOC several times. 8BYN is experimenting with filter and keying systems. 8BO is inactive. 1BEH, 3KY, 9ALK and 1AER are QRW. 1EF hopes to have a spark coil cw set soon. 8ACY has been sick. 9HP was heard in Mauritius Islands. 9BHM is on again.

Traffic: 5DW 6, 8BQA 10, 8BYN 44, 3KY 10, 1BDH 4, 1EF 2, 1AUC 7, 1AER 8, 9HP 1, 9OX 1, 9ALK 30, 9BHM 5.

Late Traffic Briefs

On May 4, 6XBR, the portable station of Warner Brothers Motion Picture Studios (March QST, p. 31) started from Hollywood for a tour of the United States. A wavelength in the 40 meter band will be used for amateur contact. Orders and reports will be sent regularly via amateur radio. All amateurs are requested to keep an ear open for 6XBR and 6KY (the base station.) A daily message is sent to 6KY at 9:30 P. S. T. after establishing contact. A \$500 award will be made the amateur turning in the most complete and correct copy daily. Second prizes of \$200 and \$100 are worth trying for. Further prizes will be given for the best story of the trip and for reporting the signals from the greatest distance. The Section Manager of the Southern Section of the Pacific Division and two League members picked by him will serve on the committee of eight in awarding the prizes. Reports by letter or card should go to Radio Dep't, Warner Bros. Studios, Hollywood, Cal.

During the tour of 6XBR, a monthly program conducted by the Southern Section gang of the A.R.R.L. will be put on at KFWB. The first program, May 3, was a great success. There was plenty of talent and lots of the necessary pep to put it across! A. R. L. songs and stunts were balanced with interesting talks about the amateur, his traffic work, his DX, his apparatus, and his position as a radio technician. FB, everybody!

Midwest Division Convention

ROUNDLY one hundred hams from at least six states assembled at the Campus of Iowa State College at Ames for the annual Midwest Convention and Radio Short Course, on Friday, April 16th. In the afternoon 9DNG, Fergus McKeever, of Lawrence, Kansas, started the ball rolling with his talk on International Communication. Upon the conclusion of this, Mr. Porter H. Quinby, Midwest Division Director-Manager, took the stand and told all about the general condition of the A.R.R.L., the significance of our worthy organization, and the recent changes made by the last Director's meeting. Our DM and Director is an enthusiastic and sincere supporter of the League and deserves a great

deal of credit for the sacrifices he has made and is making in this regard. Next Mr. E. W. Phillips, 9BGK, of Omaha, told us about filters, their construction and usage. The manner in which he presented his subject made it easily understandable to all present, even the young squirts.

The banquet was pulled at the Cranford Banquet Hall over in "Campus Town." There was not a single empty chair at this festivity. Between courses elections were held on the "most popular ham," "best brasspounder," etc. 9CCS copped the former distinction, while Fred Schnell and Quinby tied for the latter. A tie would not do, so two pieces of pie, exactly alike, were obtained, the contestants blind folded, and set to work. Quinby finished a little over a mouthful ahead of Schnell. After the dinner moving pictures were shown of Trans-Oceanic and Marine Radio. The prizes were then awarded. Some very fine pieces of ham and BCL apparatus were given away by courtesy of the manufacturers, all of whom are consistent advertisers in QST. 9BSL snaffled first, with 9DEX, 9CCS and 9BOS coming along as 2nd, 3rd and 4th. Many other prizes were given, their number prohibiting mention. C. T. Norton, of 9CL and the Campus Radio Club, was an able toastmaster. It kept him busy, too.

Saturday's functions commenced with Fred Schnell's very interesting description of his trip with the Navy. The writer takes liberty to represent the whole Midwest gang in thanking Fred for coming to Ames and lending us his spirit in Amateur Radio. It is hoped that the ideals and spirit shown by him will incorporate themselves in all those who were present, to champion and perpetuate our A.R.R.L.

Arthur Collins, 9CXX, of Cedar Rapids, the next speaker, described a transmitting and receiving circuit, each using two tubes, the transmitting circuit generating equally both halves of the R.F. cycle, and the receiver rectifying both halves of the R.F. cycle.

The afternoon was spent on the subject of brasspounding. Schnell and Quinby gave very good talks, assisted by others.

Thanks are due the Campus Radio Club and the Alpha Sigma Delta frat for the splendid program arranged. All meetings were presided over by Mr. Don E. Watts, ADM of Iowa, who handled the program in a very creditable manner.

—Louis R. Huber 9DOA-9AEJ



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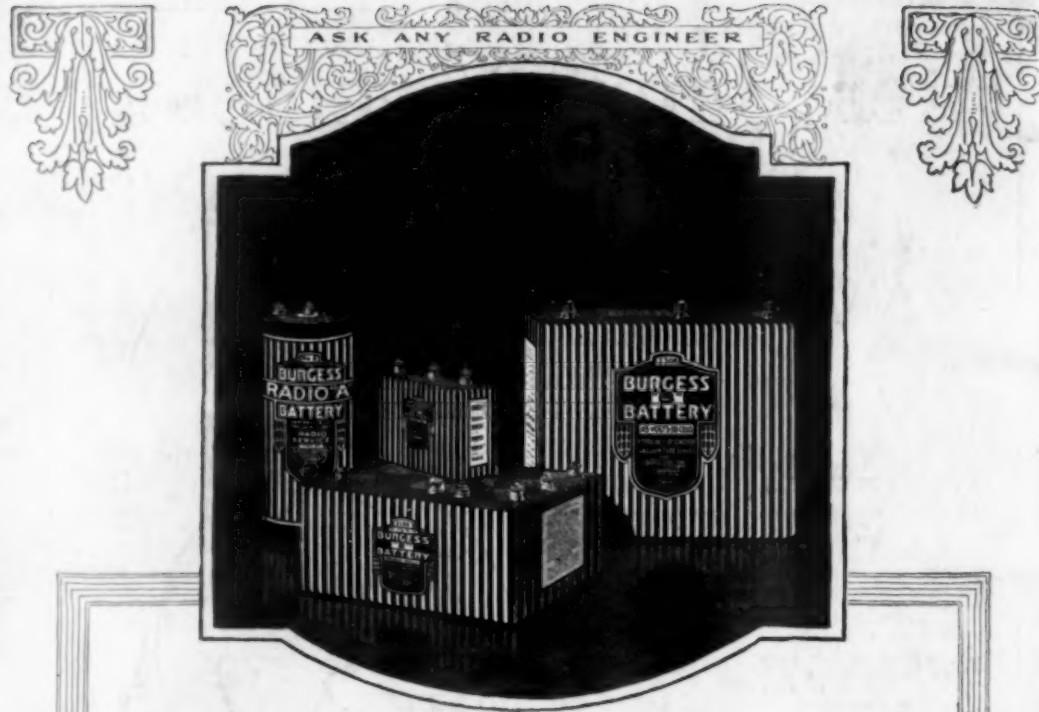
Remember that the subscription rate (A.R.R.L. dues) is \$2.50. Remittances don't go—only new subscriptions count in this offer.

This offer expires July 31, 1926.

All right, gang—send 'em in!

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